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CONSTRUCTION OF THE CANTON-SAM SHUI BRANCH OF THE CANTON—HANKOW RAILWAY.

VOL. II: No. 8. MANILA AND SHANGHAI, JANUARY, 1906

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# THE FAR-EASTERN REVIEW




## ENGINEERING, COMMERCE, FINANCE.

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# THE FAR EASTERN REVIEW

COMMERCE ⊛ ENGINEERING ⊛ FINANCE

VOL. II. MANILA, P. I., AND SHANGHAI, JANUARY, 1906. No. 8.


## CONSTRUCTION OF THE CANTON=SAM SHUI BRANCH OF THE CANTON=HANKOW RAILWAY


(By C. W. MEAD, C. E., Late Engineer=in=Chief of the Canton=Hankow Railway)

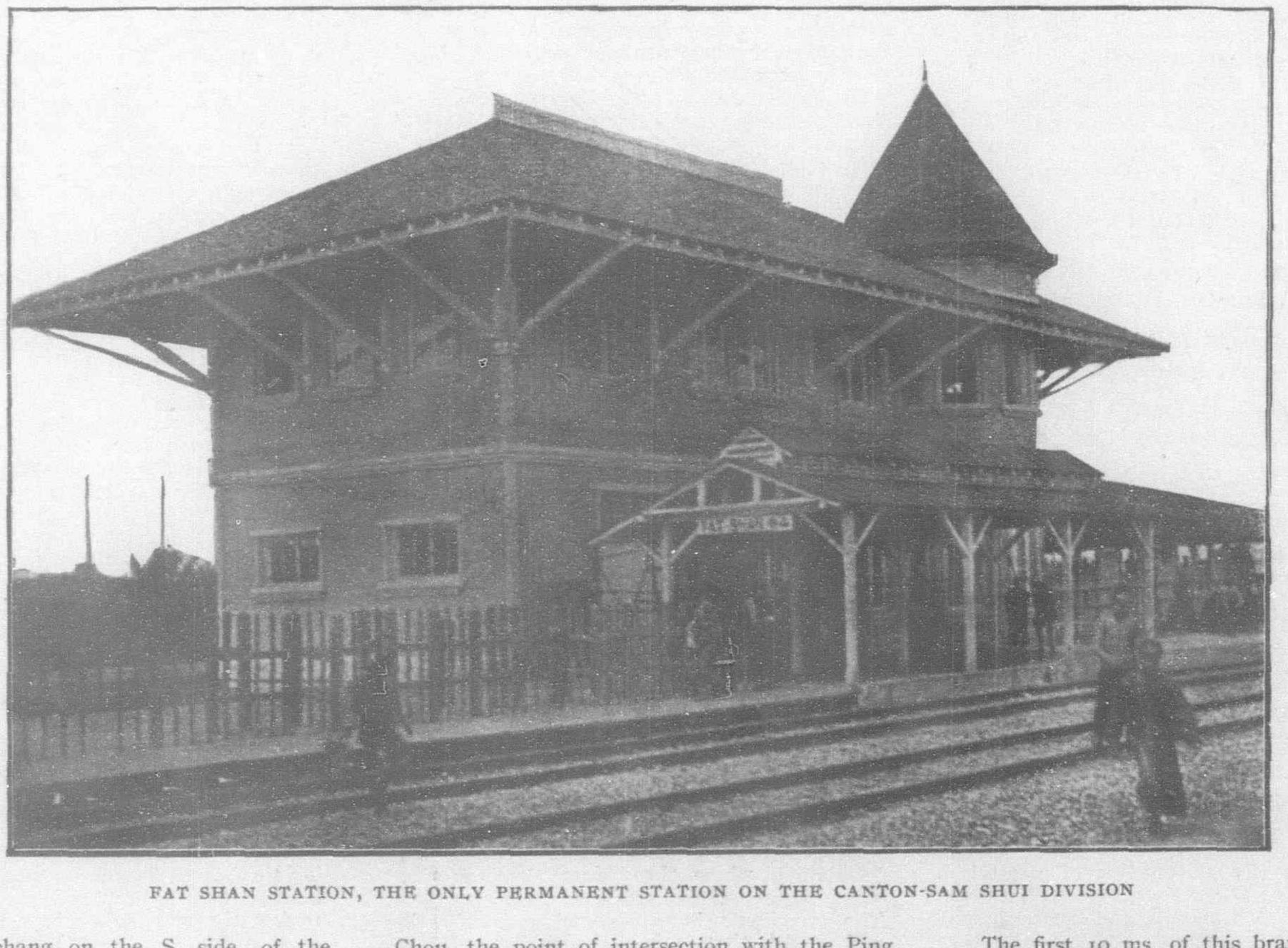

The main line of the Canton-Hankow Railway will connect Canton, the great S. China metropolis, with Hankow, the most important of all interior Chinese cities.

Leaving Canton the line runs N. up the Pearl River about 30 ms. where it strikes across to the Pei River following the valley about 100 ms. to Shao Chou, thence up the Wei River to near its headwaters, where it crosses a range of mountains onto the headwaters of the Lei River which flows N. into the Siang and Yangtsze; then following the Lei, Siang and Yangtsze valleys to Wuchang on the S. side of the Yangtsze opposite Hankow. The line traverses a country rich in both agricultural and mineral resources, and thickly settled except in the mountainous districts and some of the flooded sections of the Yangtsze and Siang River valleys.

Approximately the main line is 750 ms. in length, and there are about 150 ms. of branches, of which the most important is the Canton-Sam Shui line which has been constructed and in operation for 2 yrs. An important feeder leading from Ping Hsiang to Chu Chou, about 60 ms., has been constructed, and is now in operation. This will bring the products of the Ping Hsiang coal mines, owned and operated by H. E. Sheng Kung Pao, to Chu Chou, where they will be transhipped to the Han Yang Iron Works also owned and operated by Sheng.

SURVEY OF THE LINE.—A reconnoissance survey was run over the entire line by Wm. Barclay Parsons in 1898-9. Since then preliminary surveys have been run from Canton N. nearly 150 ms. and 100 ms. of same permanently located. On the N. end preliminary and location lines have been run from Yo Chow, at the mouth of the Siang River, to Chu Chou, the point of intersection with the Ping Hsiang branch. This is a distance of 150 ms., and is probably the portion which will be first constructed. This section, in connection with the Ping Hsiang-Chu Chou branch will deliver coal and coke to the comparatively deep water navigation of the Yangtsze whence it will be distributed along the lower Yangtsze by boat.

The Canton-Sam Shui branch for the first 14 ms. out from Canton runs over a flat country of alluvial formation and entirely covered with rice fields, cane, and vegetable gardens. This country is cut by many tidal streams some of them being 125 ft. wide and very deep. Beyond Chai Bin the country assumes a broken aspect, and many low ridges separate the various valleys across which the line runs. These ridges are mostly of soft sandstone, only one reef of hard rock being found, and that was a black basalt at Wong Ting See, 3 ms. E. of Sai Nam. The entire country except the ridges would be subject to overflow except for dykes which are about 7 ft. near Canton, while at Sam Shui the main dyke is 30 ft. high. All the streams crossed are navigable for some kind of craft at some time during the year, and this fact forced an ascending and descending grade at the principal crossings.



FAT SHAN STATION, THE ONLY PERMANENT STATION ON THE CANTON-SAM SHUI DIVISION

The first 10 ms. of this branch to Fatshan is double-tracked and the last 20 ms. is single-tracked. The double-tracked portion has 13 ft. centers and 31 ft. roadbed; is laid with 75-lb. steel rails on steel ties and ballasted with broken stone on the Canton end and sand on the Fatshan end. The single-tracked line has a roadbed 18 ft. wide, is laid with the same weight rails upon Japanese oak ties, and is entirely sand ballasted.

The alignment is very good having a maximum curve of 4° and none over 3° between Canton and Fatshan, except the 6° curve of 10°3 at Fasthan, which was put in order to place the line close to the town. The


*(Continued on page 202.)*

# THE FAR EASTERN REVIEW

GEO. BRONSON REA, M. E.

PUBLISHER AND EDITOR

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A MONTHLY REVIEW OF FAR EASTERN TRADE, FINANCE, AND ENGINEERING. DEDICATED TO THE INDUSTRIAL DEVELOPMENT AND ADVANCEMENT OF TRADE IN THE PHILIPPINES AND FAR EASTERN COUNTRIES.

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MANILA AND SHANGHAI, JANUARY, 1906


## WATERWORKS AND SEWER SYSTEMS FOR MANILA

Proposals for the construction of a gravity water supply and a sewer system for the City of Manila have been opened, and the contracts for these vastly important works let by the Municipal Board, since the beginning of the new year. This is a very good beginning of 1906 in the matter of progress, by the municipality. We believe it places us in the lead as regards city improvements, of all municipalities in the Far East. However, it is best that we wear our laurels with becoming modesty because our neighbors over the way are beginning to take our works out here very seriously just now, and it would not be policy on our part to dampen their interest in us by "pointing with pride" to our public spirit.

Four million dollars gold have been set aside by the municipality for public improvements, most of which will be spent on the new water and sewer systems. The construction of the water system goes to the Atlantic, Gulf and Pacific Company and the Matson, Lord and Belser Company, while the Atlantic, Gulf and Pacific Company will build the new sewer system. Both of these concerns have a record for thorough-going engineering and construction methods, so it is safe to predict that they will fulfill their contracts with the city promptly and to the letter.

Considerable interest centered in the letting of these contracts. Competition was keen, and throughout the whole proceeding the master-spirit of the office of the Chief Engineer, Department of Waterworks and Sewer Construction, dominated. To Mr. J. F. Case, the chief of the department, great credit is due from the city for the care he has exercised in the preparation of the plans and specifications and the original estimates, and the watchful attitude he has maintained over the interests of the city. He has been assisted in his preparatory work by a corps of able co-workers, to whose thoroughness is in a measure attributed the efficiency of Mr. Case's office. On other pages of this issue will be found details of the proposals.

## CHINESE SITUATION AND BOYCOTT

It is indeed time that the Government at Washington were changing its policy with referrence to China. Indications point to the application of the "mailed fist" at a very early date, and unless the signs fail the Americans will soon take the initiative in a demonstration against China which must result in great good to all foreign interests there. We do not believe in bombastic utterances, nor sensationalism; but we must insist upon fair play for the foreigners whose circumstances have placed them among the Chinese.

Our policy towards the Celestials has been altogether too magnanimous. Like most of the other Orientals, kindness and the spirit of friendly liberality towards the Chinese have fanned into a flame the subdued hatred of the yellow people. Now that all the damage has been done, that the Chinese have paralyzed American trade and industry in their own country, up pops Washington with a specter which has the appearance from this far-off vistage of war. We are opposed to war, but if it must come to teach the Chinese the lesson which they should have been taught during the Boxer uprising, then the sooner it comes, and the quicker the lesson is taught, the better for all concerned. Our policy which practically forced the other Powers to maintain the integrity of China, our expressed intention to return the indemnity we exacted from Peking as a result of the Boxer movement to China for educational purposes, and our other near-sighted diplomatic deals to protect "oppressed China" against the ravages of "spoilsters," have brought down upon us the contempt and hatred of the Celestials. And we are inclined to the belief that this policy is largely responsible for the boycott movement and the general anti-foreign campaign which promises to throw the entire Chinese nation into a seething furnace of violence during the New Year's season now close at hand.

Chinese contempt for Americans is not confined to China itself. We have lately been getting large portions of the article right here in Manila, where the Chinese have received every protection that our laws could give them. The merchants have become so overbearing and curlish that it is well-nigh impossible to deal with them. Everywhere you meet the Chinaman, be he merchant prince or coolie, he glowers at you with eyes that fire bolts of hate and fury into your face. He is doing everything in his power to menace American trade right here in these Islands, and he should come in for his share of the lesson Washington threatens to teach his kinsmen in China.

While war may be necessary to settle the Chinese question, we would like to see another remedy tried first. We would like to see Washington send an ultimatum to the Peking Government to the effect that if the anti-foreign movement is not immediately suppressed and kept down, if damages are not immediately paid to the American concerns that have suffered loss on account of the boycott, and if the Chinese do not conduct themselves towards Americans with respect and a spirit of absolute fairness in business,—if these requirements are not complied with immediately, and earnestly adhered to in the future, every Chinaman who is prospering and living on American soil will be summarily deported to the home country. We believe such an ultimatum would "change the face" of the Chinese most effectually, and have a tendency to keep it "changed" for some time to come.

We can do without the Chinese very nicely out here in the Philippines. He is absolutely of no service to the Islands. His sole game is to rake in all the money he can get hold of, spend only enough to keep himself from starving and his body from becoming entirely nude, and horde the surplus. Enterprise and public spirit are not one of his characteristics, nor does he care for the future of the Islands. He is living only in the present—for himself—and for the sake of the money he can bury. With the outcropping of the Chinese character he looks to us more like a menace to the progress of the Philippines at the present time than he has ever looked before. Choosing between the Filipino and the Chinese, we take the liberty of saying that for ours we will have the Filipino every time.

## PHILIPPINE MINING LAWS

On other pages of this issue of THE REVIEW appears a strong appeal to the Congress at Washington for a modification of the mining laws of the Philippine Islands, by Mr. H. D. McCaskey, who is at the head of that division of the government under which the mineralogy of the Islands is being developed. Mr. McCaskey's qualifications and his long official service in the archipelago eminently qualify him to speak for the miners on this question. He makes a very conservative and at the same time conclusive argument for more liberal laws to promote the mining industry, and we hope that our legislators in the homeland will read his petition carefully and thoughtfully to the end that they may receive his recommendations favorably, and act accordingly.

## BRITISH NORTH BORNEO

The last issue of *The British North Borneo Herald*, received at our exchange table, shows that "Charter Day"—the twenty-fourth anniversary of the incorporation by royal charter of the British North Borneo Company—passed by recently. The paper in question is the official organ of the British North Borneo Company, and in indulging in retrospect in its "Charter Day" issue *The Herald* says that this "retrospect appears to us to be one which must be eminently satisfactory to the shareholders as well as to those original members of the Court of Directors—few enough in number now—who have borne the burden and heat of the day from the commencement of operations." It is the belief of *The Herald* that the record of progress in this state is one of which any country would be proud; so, because of the close proximity of British North Borneo with the Philippine Islands, and the cordial and increasing commercial relations which exist between that state and the Sulu Archipelago,—which, we believe, is a tie that makes mutual progression of general interest and importance,—we feel called on to review the march of progress in Borneo even as seen through the eyes of the official organ of the British North Borneo Company.

The state has been administered for less than 25 yrs., the whole fabric of administration having been built up; prosperous towns have arisen where none existed; wharves have been constructed at each of the five principal ports; a telegraph line has been run right across the state, with necessary branches; a railway 120 ms. in length has been pushed through the pathless jungle and engineered over morasses, over rushing streams and up the most difficult Padas Gorge; a revenue raised which at the close of 1905 was estimated at $1,020,000, and an import and export trade fostered of the combined total in 1904 of $7,168,000, of which the

exports were over $4,000,000 and the imports nearly $3,000,000. The rapidity of progress can better be appreciated when it is cited that the revenue for the 15 mos.' administration by the provisional association prior to the granting of the royal charter was but £6,360—say $100,000 at the then rate of exchange; and that, during the succeeding 18 mos.' administration by the new chartered company up to the end of 1883, the total reached £24,801—say $360,000 or $240,000 *per annum;* while between 1900 and 1904, the actual revenue received rose from $587,000 to nearly $929,000, showing in the former year a surplus over revenue expenditure of $189,000 and in the latter year a surplus of nearly $375,000. The estimated surplus in 1905 is estimated at $429,000.

The claim is made by *The Herald* that no other British colony or protected state within range of British North Borneo—making special reference to the Straits Settlements and the Federated Malay States—can show a better comparative record of progress. It asks:—

"What was the revenue of Penang, for instance, after the first 24 yrs. of administration? what that of Singapore even, with its wonderful commercial position? and what that of Sarawak?"

Perak and Selangor are cut out of the comparison by *The Herald* since they were already in possession of ascertained mining industries when the British residential system was introduced, and British North Borneo had no ascertained industry at all.

That the administration of the affairs of British North Borneo does not bear hardly upon the governed is shown by the increase in population and in immigrants; and in the continued formation and development of tobacco, mining, rubber and other industrial companies which mostly submit very satisfactory results in reports to their head offices in London. Licenses and customs are items of revenue which afford a true index to the progress of countries like Borneo, and here are the figures which *The Herald* presents:—In 1900 their combined total was $439,090; in 1904, it was $654,000; and in 1905, it is estimated at $728,000.

From all of which we are gratified to give due credit to the wisdom and foresight of the British North Borneo Company's administration in this state. We believe that the policy which has been pursued for 24 yrs. down there could be emulated with benefit to ourselves, and without partiality we venture that the progress of the Moro Province may be attributed to some extent to its close geographical proximity with British North Borneo, which makes it possible for the administrative influence at Sandakan to be felt at Zamboanga.

## MANILA POSTOFFICE

In the past month an attempt has been made through the columns of a Manila paper to discredit the postal service of this city on account of what appears to have been a personal grievance—illy conceived—against a division of the postoffice, augmented by an error on the part of someone which delayed the removal of mail from a vessel which arrived from Hongkong.

While we do not intend to revive a controversy which, in our opinion, should never have occurred, we are constrained to say a good word for the management of the postal service of the Philippines, with particular reference to the Manila postoffice.

For nearly 2 yrs. our office has been in close business relation with nearly every division of the postoffice, and we have only words of the highest praise for the general conduct of this service. Without exception the officials and their subordinates have been courteous and obliging, even to the extent of exceeding on their own responsibility the most liberal interpretation of established regulations. With rare exceptions arriving mails have been distributed and delivered with surprising despatch, and where the public could be accommodated the postoffice forces have worked overtime, and on Sundays and legal holidays. The most trivial complaint has been investigated carefully, and we are convinced that the sole aim of everybody connected with this branch of the public service has always been, and is at the present, to maintain, and if possible increase, the efficiency of the Bureau of Posts. We claim for Manila, without fear of contradiction, the best postal service in the Orient; certainly far more efficient than that which was given to the community before American occupation.

## JAPAN'S INVASION OF SOUTH AMERICAN MARKETS

According to some journals, Japan and Brazil are getting together for the purpose of bettering trade relations. There is talk of a large number of Japanese emigrating to Brazil. A French writer recited certain facts in *The Bulletin of the Commercial Geographical Society of Paris,* to prove that the movement is more than a tentative one. These show that Japan is bound to develop trade with Brazil, as it is trying to do with Peru and other countries of South America.

The writer cited intimates that Japan is bound to be on hand when the Panama Canal is cut. One of the largest of Japan's steamship companies has inaugurated monthly voyages between Japan, Callao, and all of the important South American ports. Agencies for these boats have been opened an Rio de Janeiro and Santos. In these cities Japanese agents are at work studying the conditions with a view to settling the question of colonization. For a long time Brazil has been seriously concerned with the problem of Japanese colonization.

The State of San Paulo has paid most attention to the problem, going so far in its interest as to send its agents to Japan for the purpose of studying the Japanese people at home. Everything seems to favor a trial. The Brazilians are said to have offered the Japanese free transportation, a period of rest upon arrival, and dwelling houses. The Japanese were to work for a fairly decent wage a certain number of hours each day. The remainder of the time was to be at their own disposal. At first the Japanese were dazzled, but reflection taught them that a people who would be willing to defray the cost of transportation to far-off foreign lands could be cajoled or coerced into paying better wages than those offered. The mistake made by the Brazilians was in offering as wages maximum prices—that is, the prices they had agreed among themselves as the highest possible to be paid.

After long deliberation, no one being willing to yield, the discussion was dropped. This all happened just as Japan and Great Britain signed their new treaty. It is thought that the Brazilians expect to find in the Japanese virtues that by repute belong to the Chinese. At any rate the revival of the immigration efforts only goes to prove the allegation that they had been well under way, and, further, that Japan is favoring them at the present time. In the event that the Orient pours its millions into South and Central America, the problem connected with the wealth of the Tropics will be in a fair way to successful solution.

## TRANSPORTATION IN CHINA

A consular report recently published at Washington deals with transportation conditions in China and describes and emphasizes the value of that country's waterways, showing, also, what is possible and probable in railway building. From this report we are privileged to gather some most interesting facts.

The practical deadlock in the construction of railways in China, which has existed for the past year or so, is found to be just as marked as ever. As a matter of fact the war had very little to do with the general railway movement of the empire. The continued delay is due to Chinese rather than extraneous reasons, and probably represents an economic movement which is of the utmost importance to foreign business. The Chinese people—that is to say, the gentry—have no appreciation of the development of a country by railroads, although the need of some railways in China is appreciated by them. They seem to feel that in many ways and in most places there is no need of any change. And for heavy freights in some parts of the empire this is really the case.

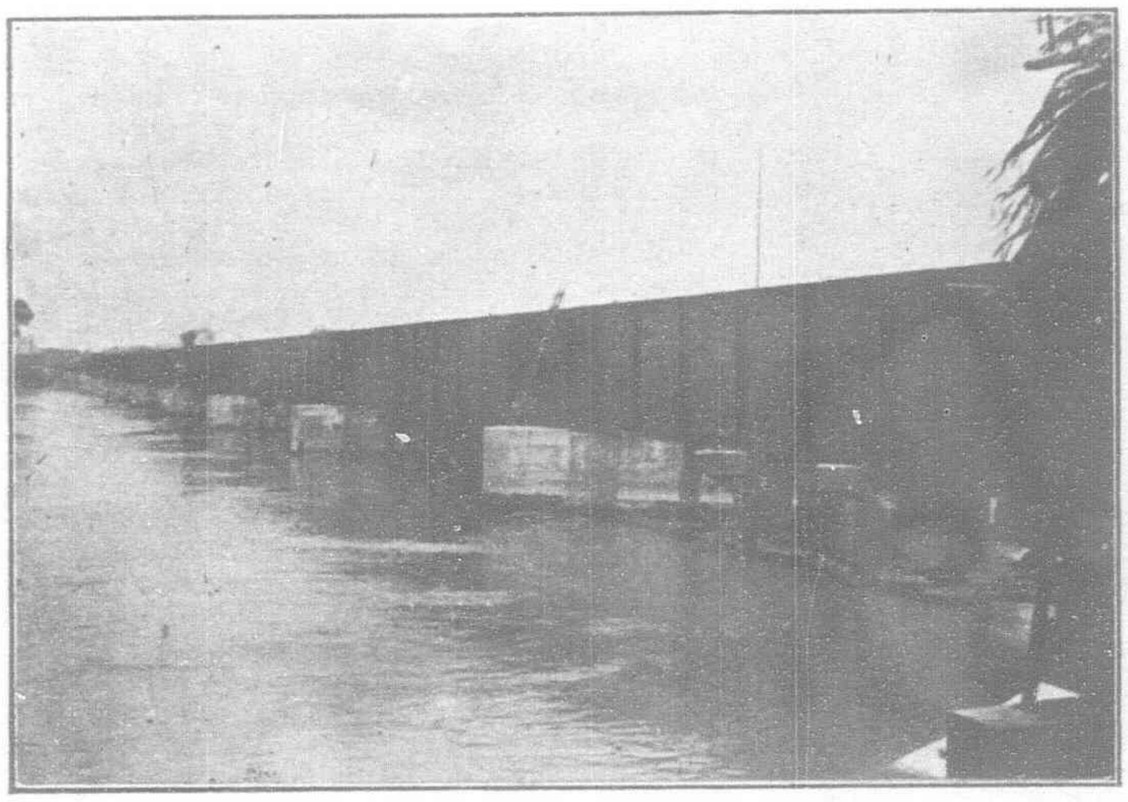
The quantity of goods transported by Chinese coolies, and in the northern portion of the empire by carts, is beyond the belief of those who have not had occasion to investigate the subject. In the interior of the greater portion of the country coolies and canals carry all freights, and what this means can be understood to a fair degree perhaps when it is realized that there is practically no railroad service at all in the most populous and richest portions of an empire containing 400,000,000 or more of people. In most of the empire there are no highways worthy of the name. In the northern provinces the traffic in carts of a rough sort dominates the entire movement of goods, in the districts concerned, to the seaboard. Where waterways are frozen a great portion of the year this is of necessity the case.

It is in that portion of the empire where waterways are frozen much of the year that the first hold of the railroads has come. The greater portion of the empire is served by waterways where it is served at all. Along the China Coast there is a series of navigable rivers coming down from the interior, a series of which has few equals, all things considered, in all the world. From the Yalu and Pei-Ho, at the N. to West River, passing through Canton, in the S., these rivers seem to be formed to reach inland from the coast, connecting not only the coast cities with the interior cities, but the interior cities with each other by way of the coast as well. About midway between N. and S., the great Yangtsze reaches far into the interior, navigable almost to the western border of the empire, and by its tributaries offering still further communication with interior points. The rapids of the Yangtsze have been and still are a drawback to the development of all the upper part of the Yangtsze Valley. But these rapids probably can be subdued at an expenditure ridiculously small, compared with the enormous benefits to follow. That this will be done in the near future, and that steam navigation, regular and safe, with Chunking and the upper river will be established and maintained, is beyond question.

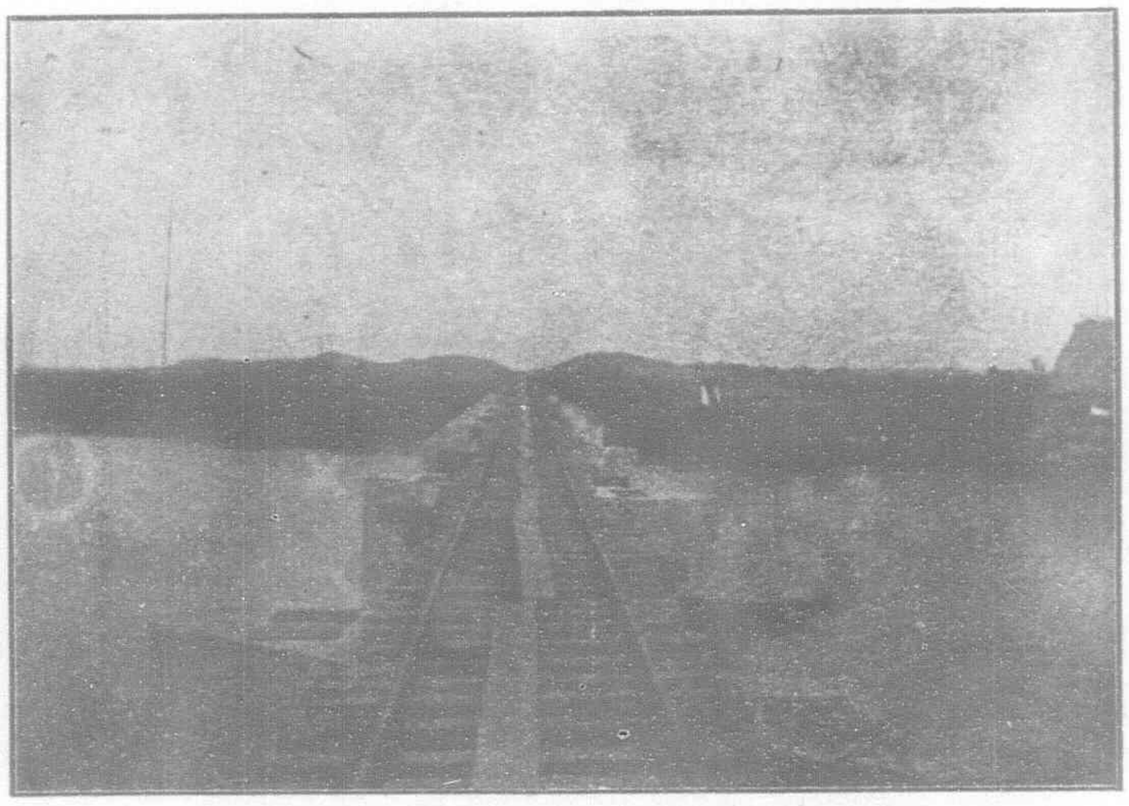
The most interesting, and in some respects the most important feature of the waterway system in China, however, is the canal system. Running more or less parallel to the seacoast from Hangchow to Peking, through a very rich portion of the empire, certainly the most important portion, commercially, at the present time, is the Grand or Imperial Canal region. Connecting with this, at either hand, are smaller canals. These, in turn, connect with still smaller waterways, and still farther are smaller streams, until the whole Yangtsze and Yellow River plains are a vast net-work of waterways, designed originally for irrigation very largely, but used at the present time both for irrigation and transportation. To become conversant with Chinese commercial conditions, one must thoroughly understand this system of streams and canals. It is a characteristic part of the life of the Chinese people. There will be no system of railroads to supplant it in its close relation to life here, and any commercial system or theory which disregards it will fall short of success. The rivers and waterways of the empire will be the basis for heavy transportation and traffic for years to come, and the railroad system (for which there is hope) will not supplant but merely supplement them.

What an adequate railroad system would do for China cannot accurately be measured, so great are the possibilities. But there is not the bright prospect in railroad affairs in China that there ought to be, and the indications are that there will be even worse conditions in the near future than those now obtaining. There are in operation about 2,200 ms. of railroads in China; there are in the course of construction possibly 1,500 ms. more. Concessions for railroads have been granted all over the empire. It may be said that every railroad China needs has been planned twice over, and concessions for many of them are already granted. But this does not mean that the lines are being constructed, or that they will be constructed. The moment that any serious work on a railroad is commenced, under a concession held by foreigners, there is opposition, delay and finally nothing accomplished.

The general prospect for any change in the general transportation facilities of the empire in the near future is not very encouraging. It hinges on political and social changes which will not come very soon.



SAINAM BRIDGE, SHOWING PIER CONSTRUCTION



SAINAM BRIDGE; TRACK LAID OVER ON FALSE WORK

## CONSTRUCTION OF THE CANTON-SAM SHUI BRANCH OF THE CANTON-HANKOW RAILWAY

*(Continued from page 199)*

maximum grade is 5 10 of 1 per cent and is used at five stream crossings between Canton and Fatshan and several times over low ridges between Fatshan and Sam Shui.

ENGINEERING DIFFICULTIES.—The only engineering difficulties on this division are the bridge foundations, which were made by first driving piles to a depth sufficient to give a bearing power of 12 tons on each pile. The required resistance to penetration was usually obtained in a strata of coarse quartz sand which lay from 30 to 50 ft. below the surface and varied from 3 to 7 ft. in thickness. In some cases a bearing power of only 6 or 7 tons could be obtained, in which cases special designs were made by putting in more piles and covering more ground. The piles were cut off below water-level, all the silt taken out from between them, and coarse stones were rammed in to within 2 ft. of their tops upon which concrete was built to sub-grade and granite bridge seats put on. The spans are of 10, 15, 20, and 30 ft. deck girders, and 40 and 60 ft. through girders. There is one bridge across the Sainam River with 96-ft. spans and three other bridges on the line 120 ft. long, which have one 60-ft. and two 30-ft. girders. Several box and arched concrete culverts were used, and arched road crossings below grade. Short spans were used for economical reasons as steel laid down at the bridge sites was costly, while the cost of foundations was low owing to cheap material and labor. The ease in handling short spans with unskilled labor was a large factor, and all these reasons tended to an opposite economic condition to that found in Europe and America.

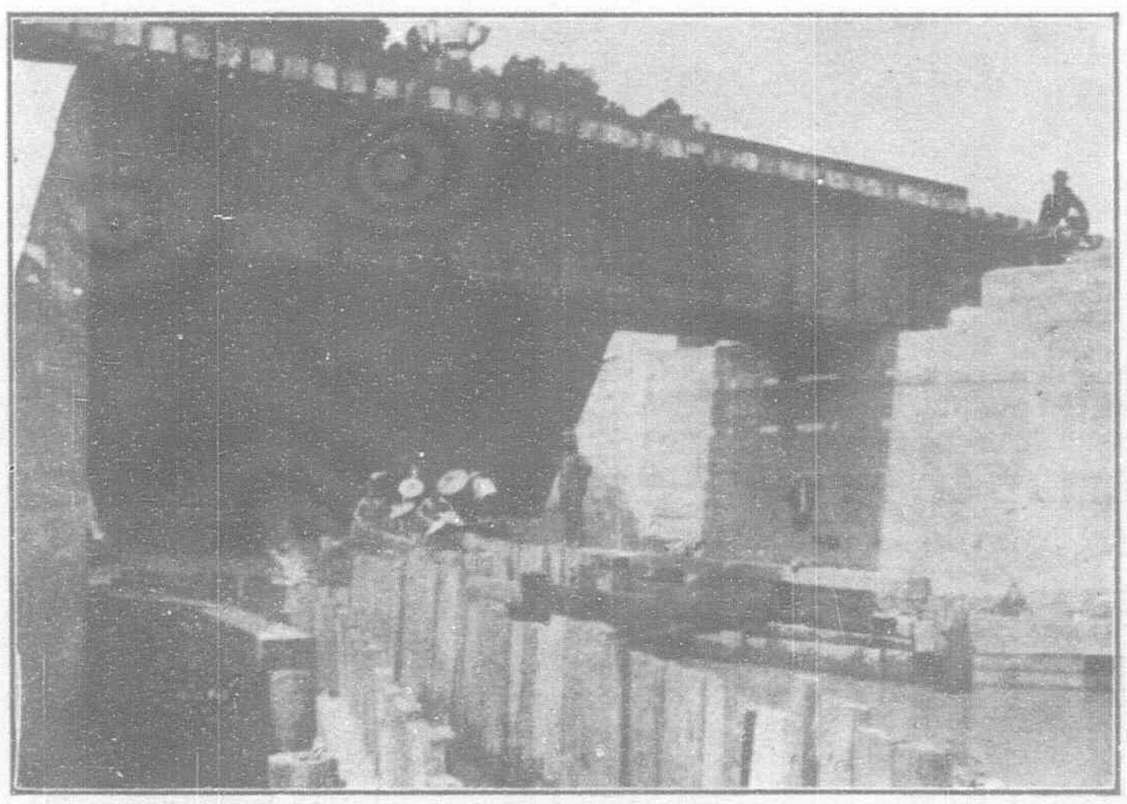
Only one permanent station was constructed and that at Fatshan. All others are small and temporary and put in at an average distance of 2 ms., thus giving the traffic an opportunity to develop and decide where stations were necessary. The Fatshan Station is a fairly handsome 2-story structure built of brick and wood and the cost was about $15,000 Hongkong currency.

A blacksmith and repair shop was established at Shek Wei Tong, which is complete enough to make all necessary assembling of rolling stock for the division and keep it in repair. This shop is entirely operated by Chinese workmen.

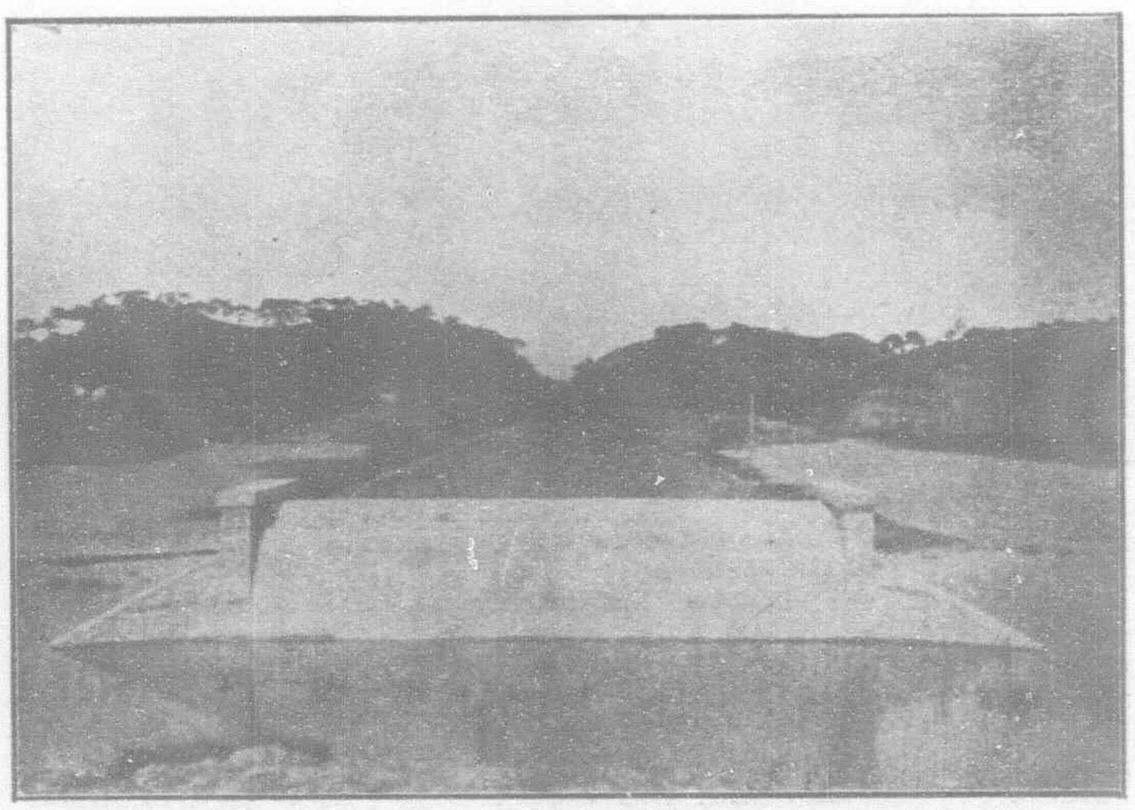
SUPERSTITION AND IGNORANCE MENACE CONSTRUCTION.—Many difficulties were encountered in the construction of this branch mainly on account of the superstition of the people and the profound ignorance of the workmen, most of them never even having heard of a railway much less seen one, but with the blandlike simplicity of the Chinese there was no trouble in finding wouldbe contractors who would undertake any kind of a contract for any price and agree to complete it in any time required. Experience taught the engineers that the Chinese were able to contract for earth embankments and shallow cuts, while all other work was more economically performed by using foreign foremen or letting the work to foreign contractors. At best it was slow and costly as all the workmen had to be first taught, and there were no experienced foremen or reliable foreign contractors available. The building of this line was not only a school to the Chinese employed but it taught the engineers in charge how to take advantage of the peculiar conditions in China. That this schooling was valuable was clearly proven by the greatly reduced cost of the work performed on the main line after the completion of the branch.

As an illustration of the difficulties encountered on account of the ignorance and superstitions of the people, when the line was permanently located to Sam Shui a strong and vigorous protest was entered by the inhabitants of a little village called Too Yuen Kong on account of a 15-ft cut through a small hill. In this protest the people said that a tiger lived in that hill and it was the guardian of the village; that, if the railway cut through it, the tiger would escape and go to the mountains and the village would go to the eternal bowwows, the poeple would die; the cocks would not crow, and the dogs would cease to speak. The engineers met the chief men of the village on the ground and discussed the matter but could bring no arguments to bear to get their consent to the location of the line, and the result was that the location was changed at this point.

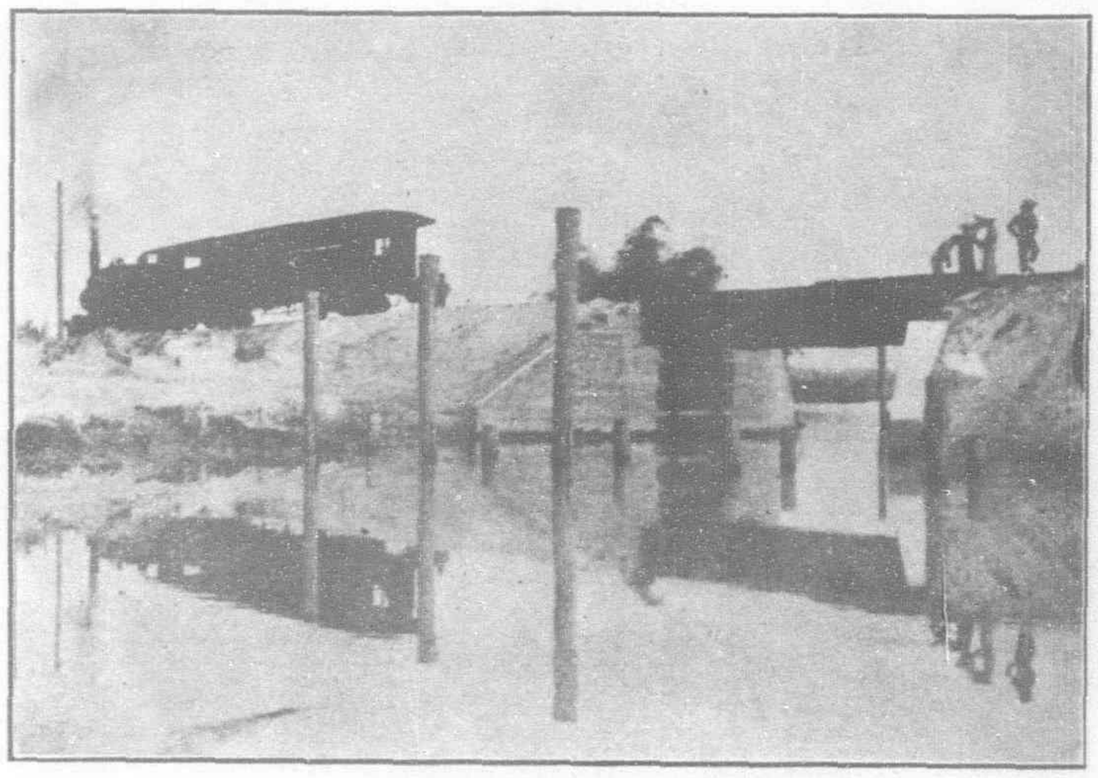
METHODS AND COST OF CONSTRUCTION.—Many unique methods of construction were used, some original and others older than the hills to the Chinese, although new to foreigners. In the construction of embankments the Chinese were fairly adept for the reason that they had been constructing dykes for hundreds of years. They entirely ignored the use of wheelbarrows or all other methods of transportation except baskets. They were finally broken in to use wheelbarrows and small cars carrying about 1 cub. yd. For the transportation of materials less than 100-ft., baskets were found to be more economical, while for moderately short hauls the wheelbarrow proved the best. The cars were used in long hauls of 1000 to



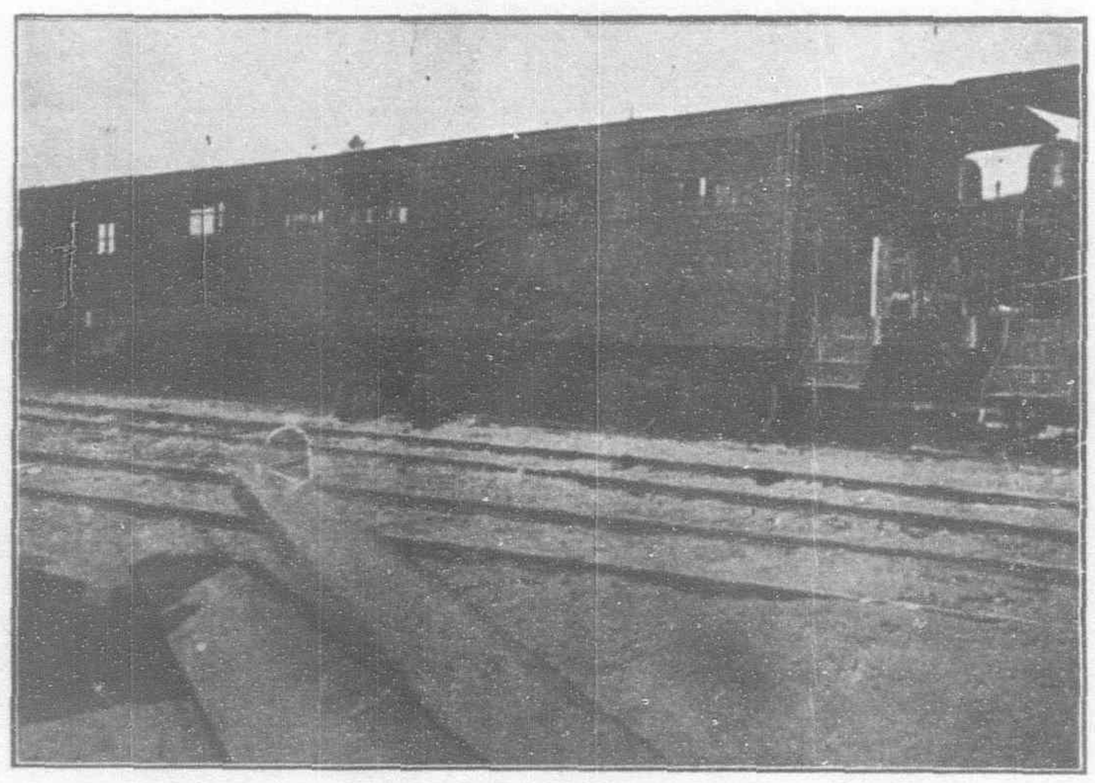
30-FT. DECK GIRDER, SHOWING COFFERDAM



STANDARD 12-FT. ARCHED BRIDGE



30-FT. DECK GIRDER; CHIEF ENGINEER'S CAR

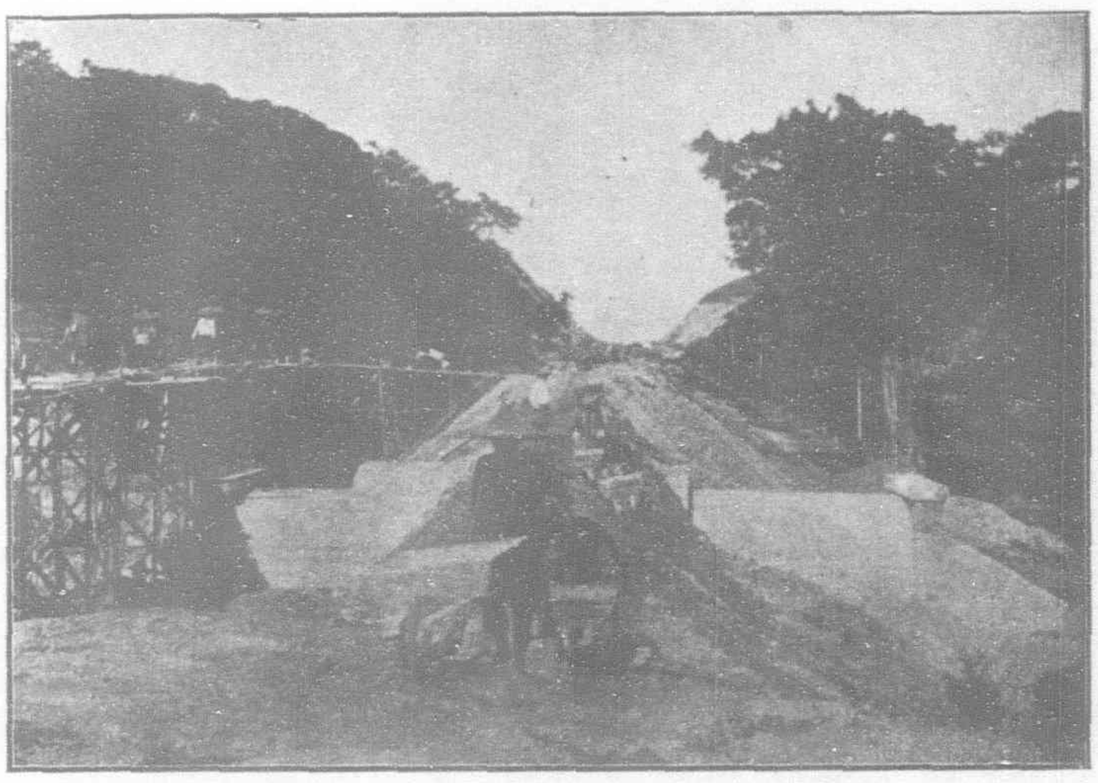


SECOND-CLASS PASSENGER COACH

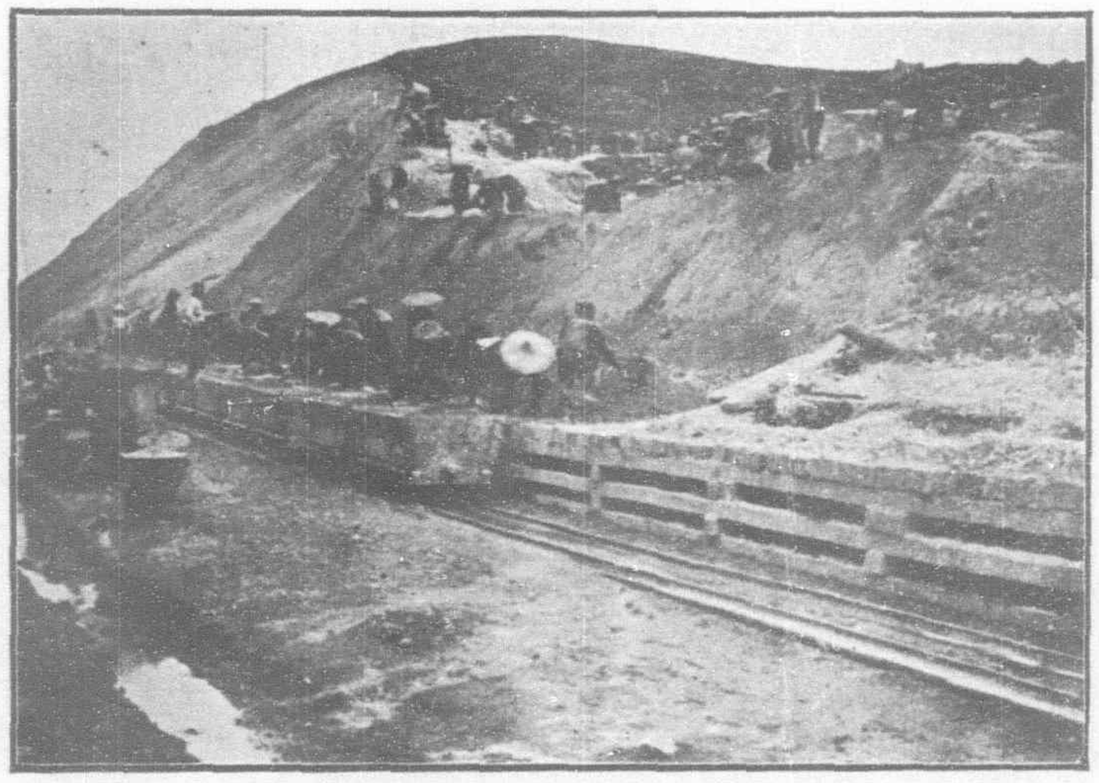
2000 ft., and at a distance of 2000 ft., ordinarily soft-cut material could be picked, shoveled into the cars and delivered into an embankment 2000 ft. away for from 20 to 25 cts., Mexican, per yd. Cost of overhaul by cars was about ½ c. per cub. yd. per 100-ft., while overhaul by basket or wheelbarrow was from 1 to 2 cts. per yd. The cost of embankments to a height of 4 or 5 ft., through rice fields, was from 10 to 12 cts. per cub. yd., the cost increasing as to height of embankment, coming up to 18 or 20 cts. in some of the highest. These prices obtained on the main line after the completion of the branch. The cost of rock excavation run from 60 cts. on the softer sandstones to $1.40 on hard trap per cub. yd.

Piles cost from 25 to 35 cts. per lin. ft. according as they were 25 or 50 ft. long. The piles used were Chinese pine brought many hundreds of ms. from the headwaters of the North and West Rivers. This wood is very poor—something like basswood—but is the best available and answers fairly well for pile foundations, but great care has to be used in driving to avoid breaking. A diameter of from 14 to 16 ins. at the butt is about the extreme size that is obtainable. The driving cost about $2 each. At the larger bridges steam drivers were used and at the smaller ones hand drivers. The hand drivers were handmade and operated with a whim. One of the drivers was fitted with a treadmill arrangement for raising the hammer, and it was found that the same number of coolies would drive twice as many piles by this method in a day as by hand, and this manner of working appealed to them more strongly than raising the hammer by turning a crank.

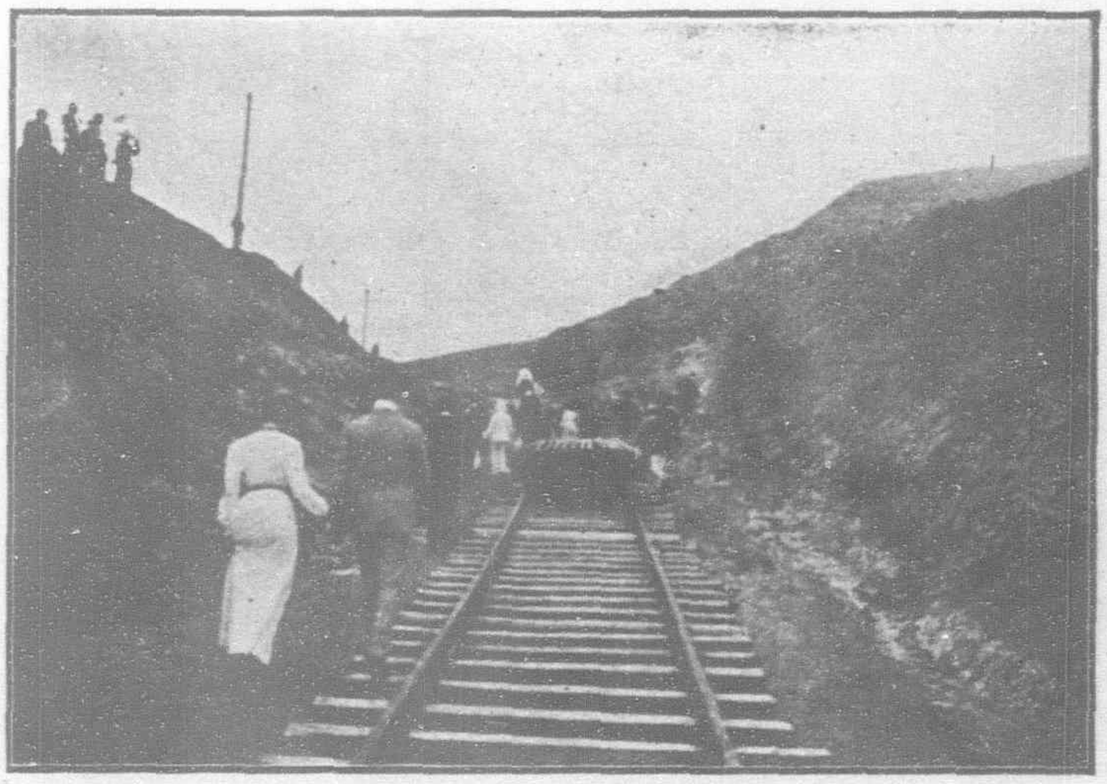
*(Continued on page 224.)*



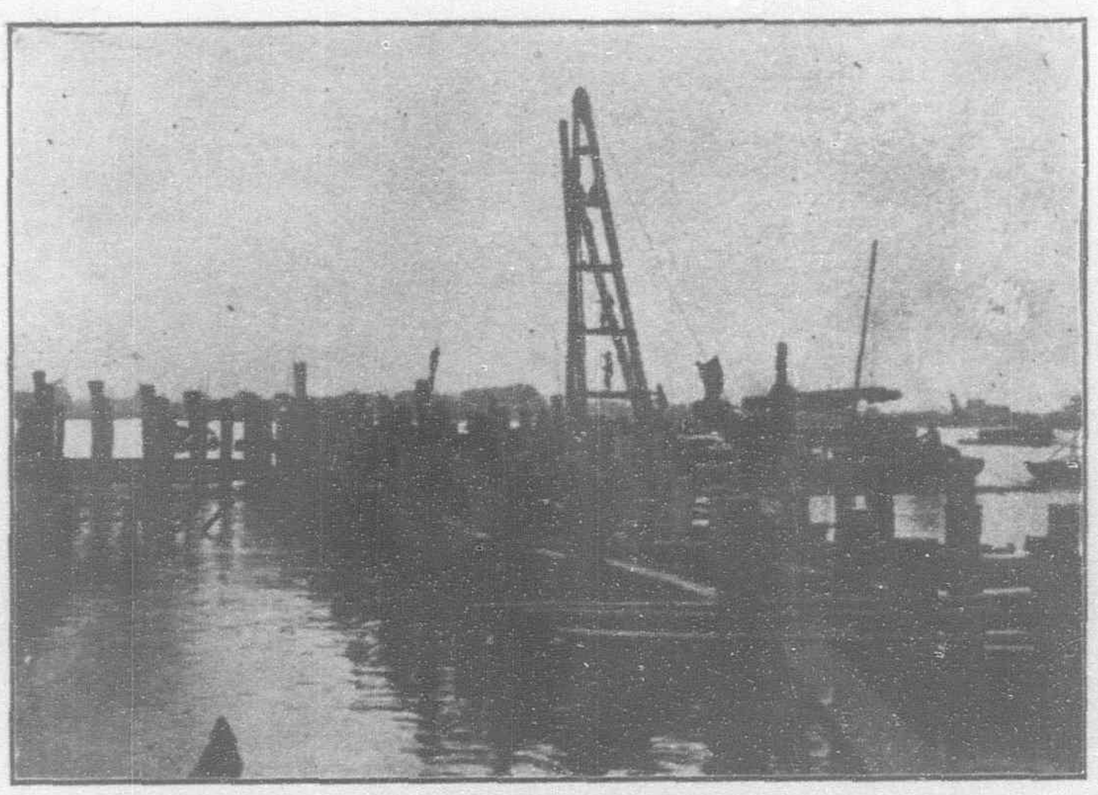
A 25-FT. FILL; SAINAM CUT, DEEPEST ON THE LINE, 70 FT. FROM SUMMIT, SHOWN IN THE DISTANCE



HAULING WASTE MATERIAL FROM SAINAM CUT TO MAKE HEAVY EMBANKMENT



END OF TRACK IN WONG TING SEE ROCK CUT



DRIVING PILES FOR WHARF AT WONG SHA TERMINAL

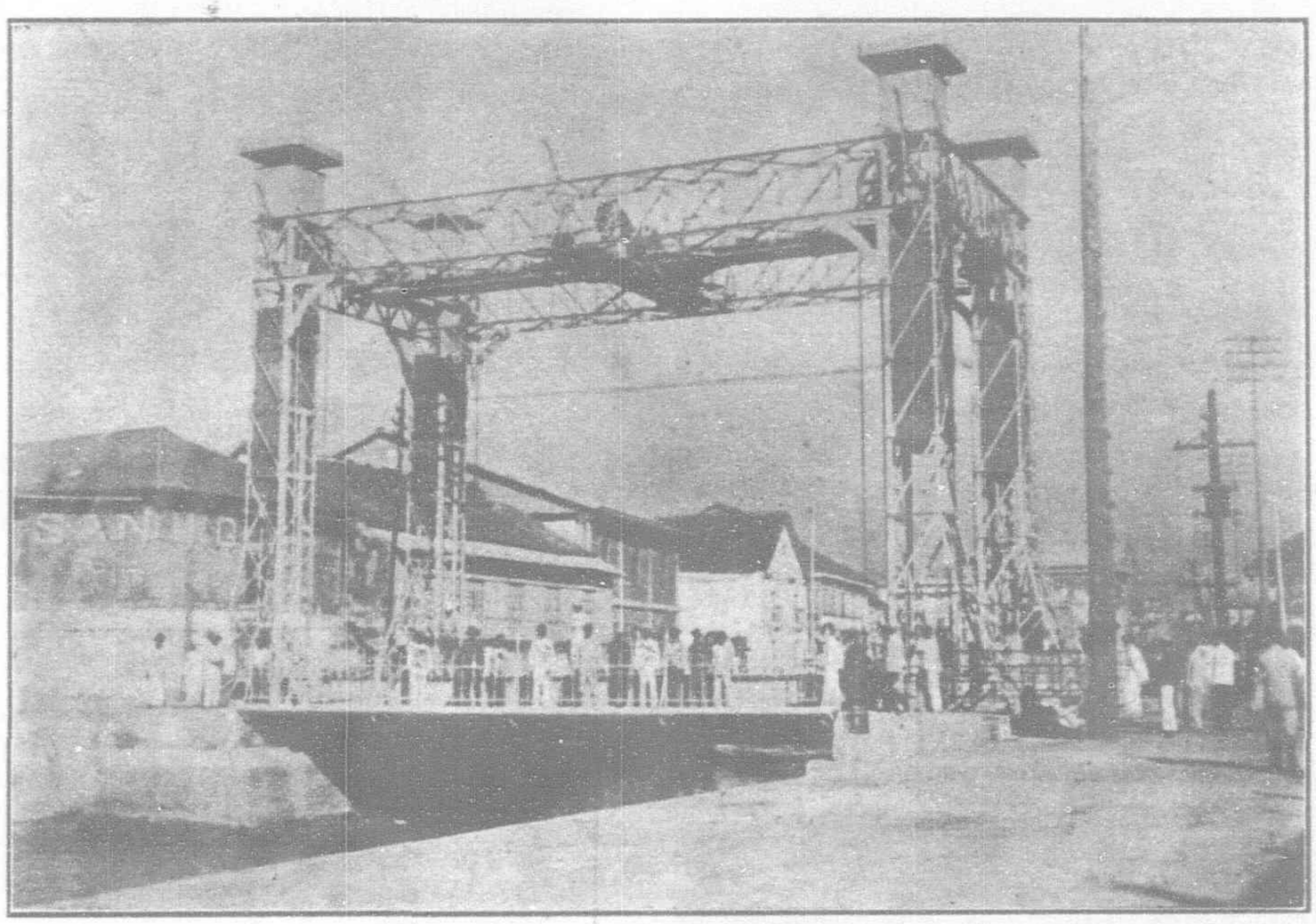
# New Lift Bridge Which Spans the Binondo Canal, Manila

**(Constructed for the City bv Messrs. Germann & Co., Ltd.)**

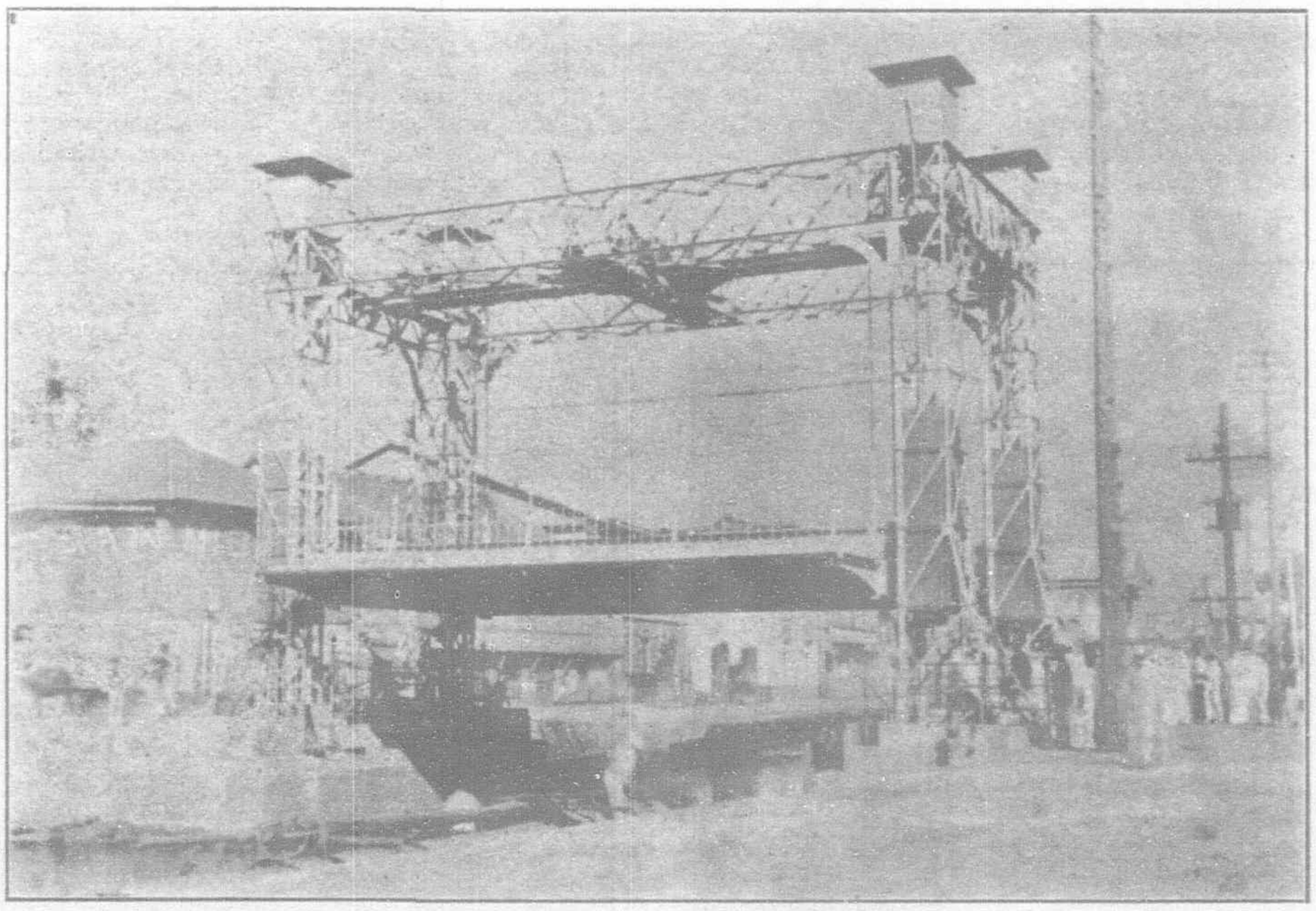
This bridge, which crosses Binondo Estero at the foot of Calle Soledad, Binondo, to Calle Prensa, San Nicolas, on the direct line of travel from the business district to the Custom House, is now completed. Its importance to the business interests is great, as a new avenue of traffic between the shopping centre and the waterfront will be afforded. The congestion at Blanco Bridge will immediately disappear and the haulage of heavy goods up the steep approaches of the latter will be reduced to a minimum. Since the completion of the tramway lines on Calle San Fernando, the traffic conditions have become very complicated and many accidents on Blanco Bridge have resulted therefrom. The new bridge will serve to direct a large part of the slow-moving traffic from Calle San Fernando and render unnecessary the heavy draying on Calle Rosario.

Work on the foundations commenced in July, but was carried on in a desultory manner until the middle of August. From that time on until the completion of the abutments in October, great energy was displayed in prosecuting the work. Much of the delay was due to the conditions which held at the site. The narrow waterway, the demands of the local traffic, and the presence of two very obstinate concrete walls directly in the line of the abutments added to the difficulties. It was decided to remove these old walls by blasting and to construct the foundations in caissons. It had been feared that the foundations afforded by the old walls would be insufficient to bear the superimposed loads, and not until a large part of the walls had been removed and a mass of well laid rip-rap was discovered was it decided to abandon the idea of complete removal of the old foundations. A row of closely driven retention piles of hardwood lumber was driven before and behind the bottom layer of the old foundations. Some difficulty was experienced in this driving, because of the old rip-rap and the occurrence of a number of retention piles about the old work.

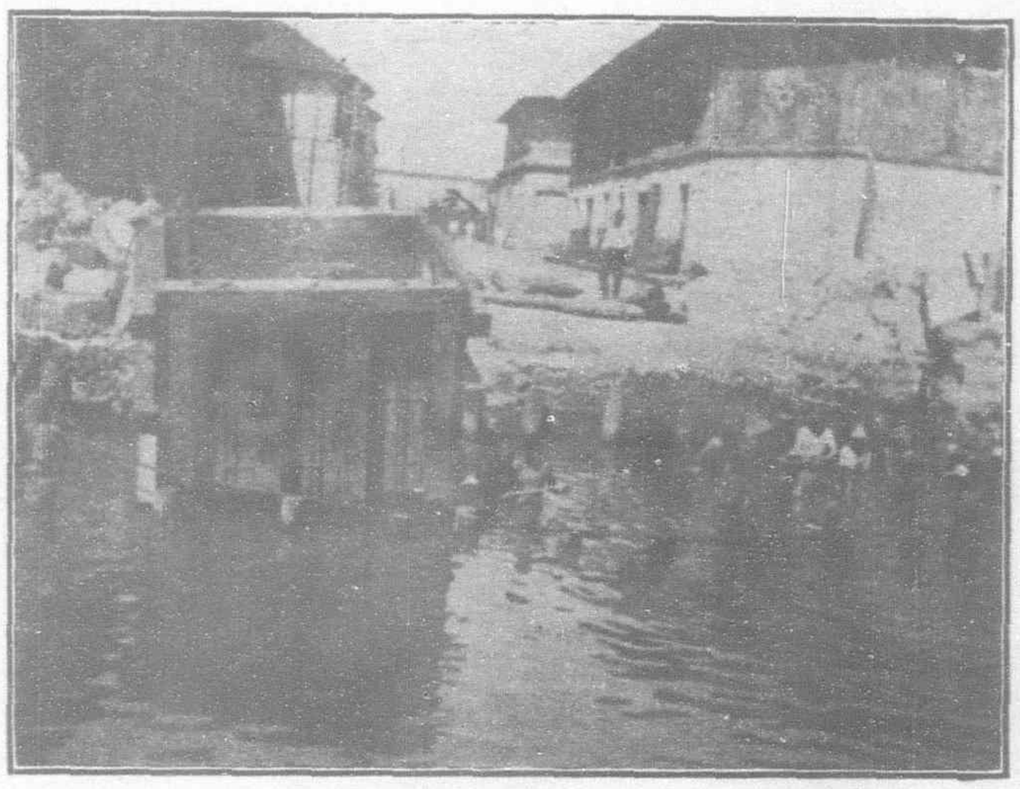
Four caissons were launched and set in place where the footings of the steel towers would bear. The bottoms of these caissons rested on the last course of masonry in the old foundations, which had been permitted to remain in place. To secure a better bond with the existing masonry, the timber grillage in the bottoms of these caissons was omitted and the caissons made watertight by placing a row of sacks filled with concrete on the outside faces. The water in the caissons was removed with hand pumps and concrete rammed in place. The screen wall between the tower foundations were laid up in concrete on rip-rap, behind ordinary batter boards, as no great pressure could come upon them, and a costly method for a secondary

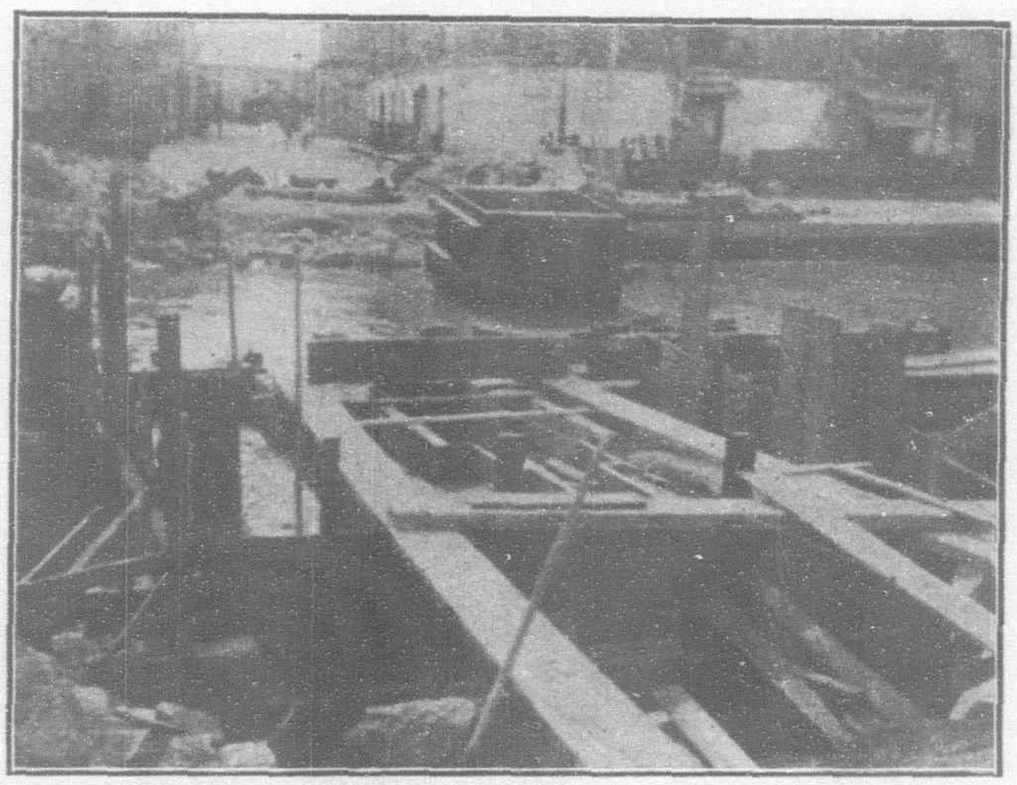


BINONDO LIFT BRIDGE ON THE DAY OF ITS INAUGURATION, DECEMBER 28TH, 1905.

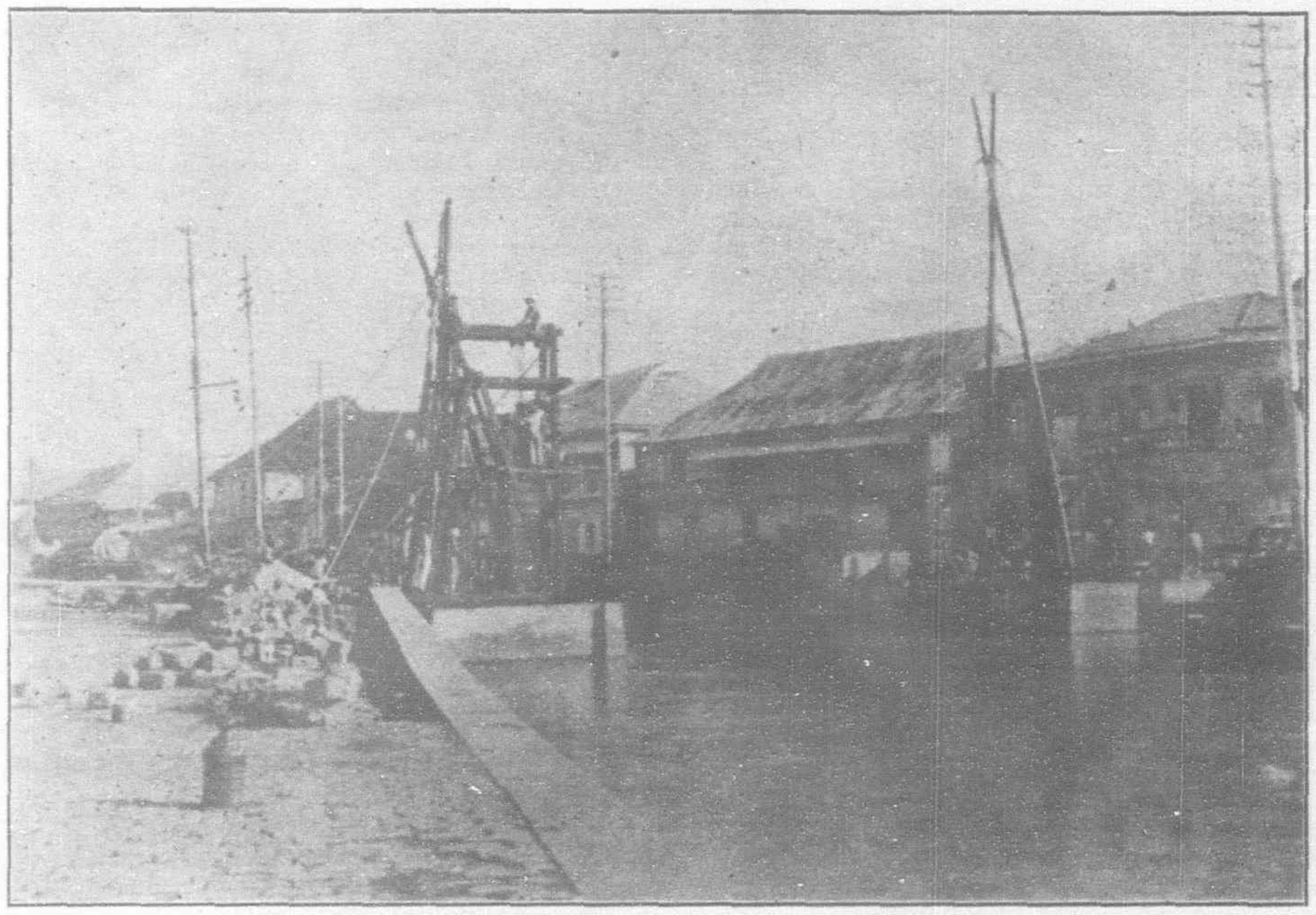


OPENING THE BRIDGE DURING THE INAUGURATION CEREMONIES.





TWO VIEWS SHOWING PROGRESS OF FOUNDATION CONSTRUCTION

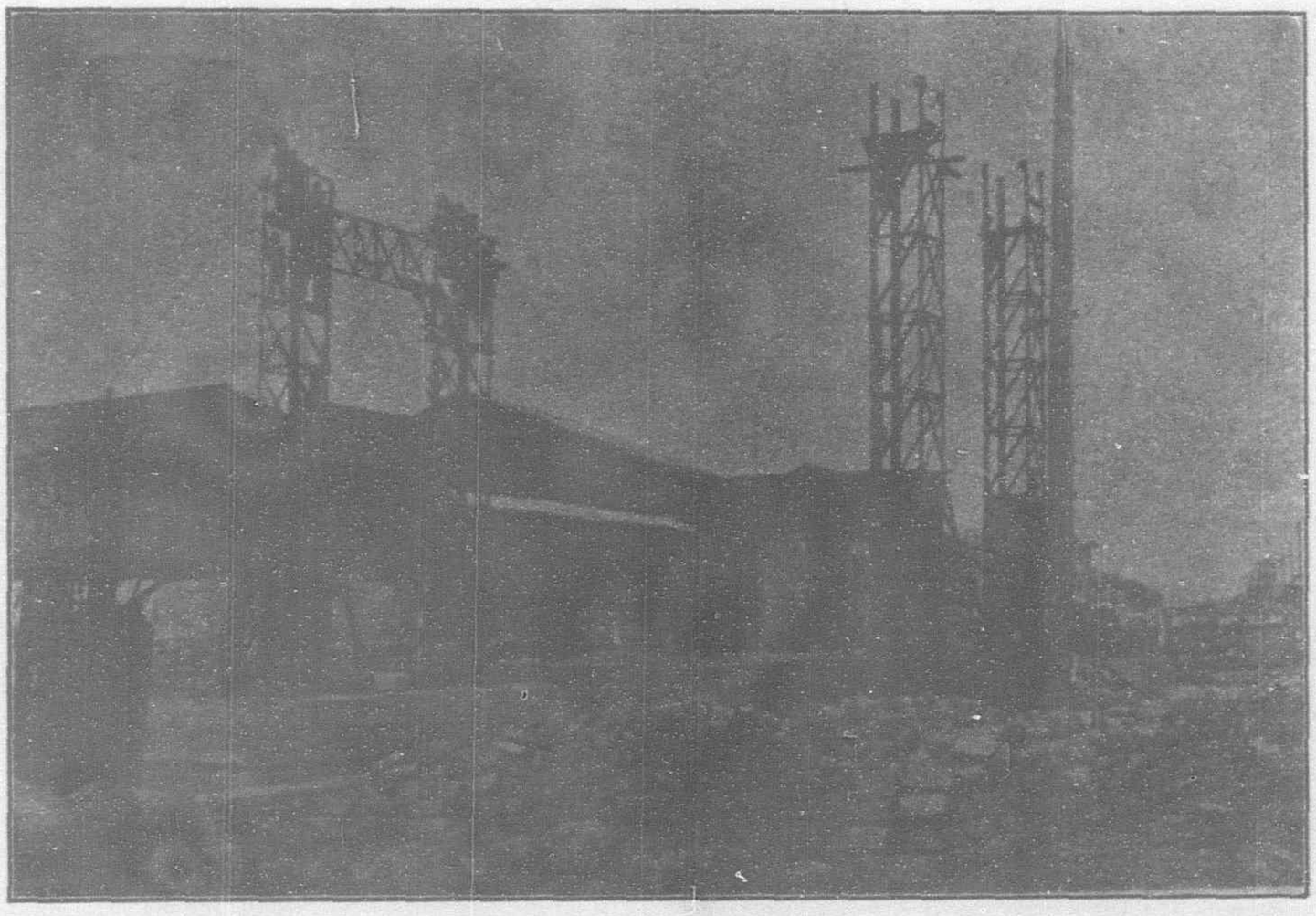


COMPLETED FOUNDATIONS; BEGINNING OF WORK ON THE MAIN STRUCTURE

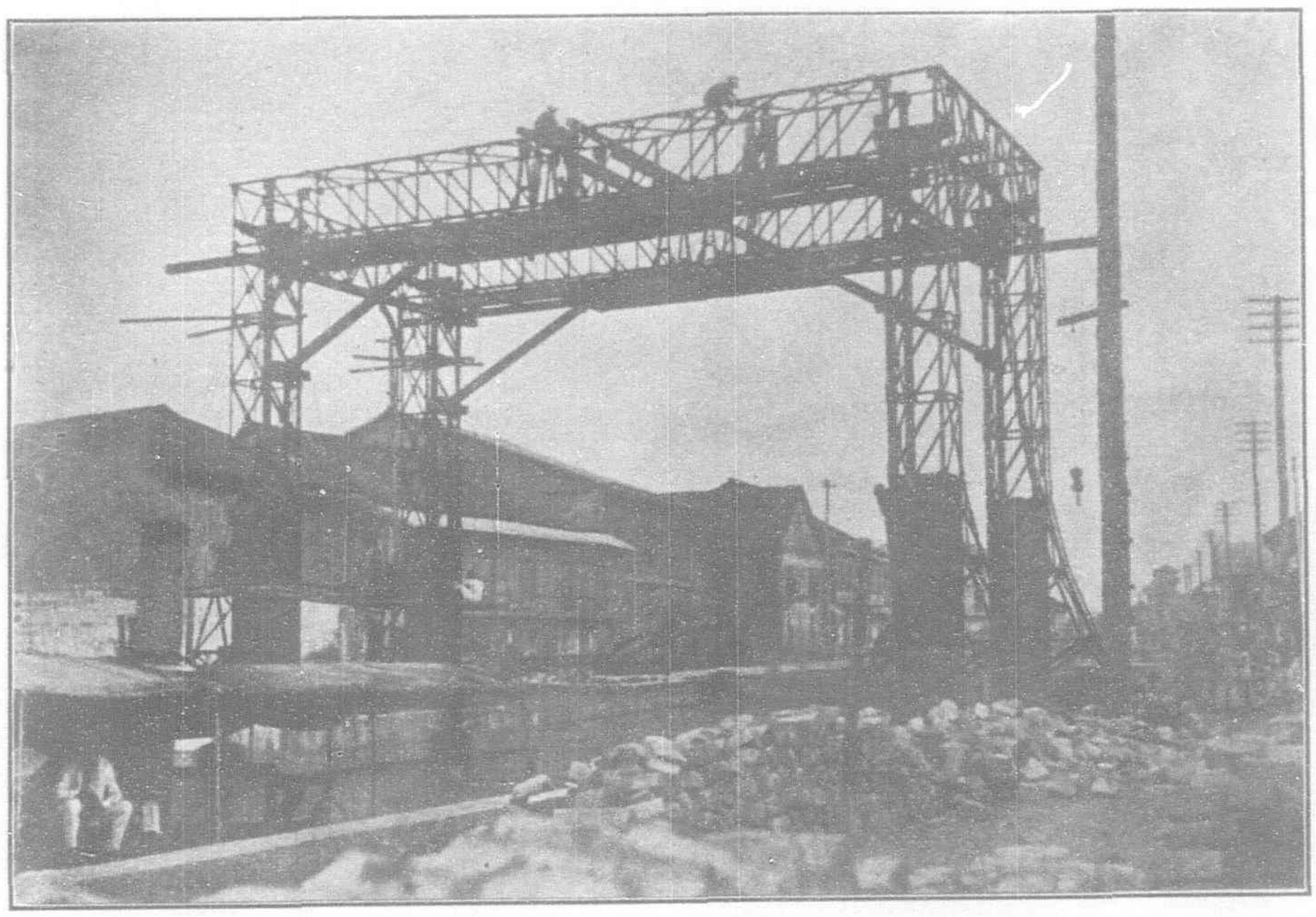
foundation was not warranted. The same method of procedure was used with the founda, tions for the machinery house. There, however- some soft material was encountered and a cluster of large Oregon fir piles was driven at the NW. corner.

The contractors for the steel work, the well-known Manila firm of Germann & Co., Ltd., commenced operations on October 1st, having been hastening the assembling of the steel work. On November 16th, the towers, floor system, cables, counterweights and sidewalk railings were in place, and progress had been made upon the buckle plate floor and the construction of the machinery house. A noticeable feature in the work has been the accurate fit of the several parts. Upon uniting the towers by the longitudinal and transverse girders, the rivets could be accurately inserted and little if any drilling was required throughout the structure. Considering that the towers and their connection girders were composed of a great number of small pieces, which arrived in Manila knocked down, and that the riveting was entirely entrusted to natives wholly unfamiliar with bridge work, the incident is rather remarkable and indicates the careful workmanship of the continental shops.

The new bridge is a very handsome structure. It is of the most modern type of lift bridge and is the first of that type ever built in these Islands. The bridge consists of one movable road bridge of 6.7 meters width with two sidewalks each of 2.31 meters width; and one solid construction of four towers each of 13.5 meters high, the top pieces of which are solidly joined together qy steel frame girders. The whole moving machinery driven by an electro-motor of 30 h. p. for a current of 120 volts 2-phase 60 cycles on the center top of the upper girder construction works so that all shafts operate at the same time and equally. Opposite the motor a hand-operating device with brakerods in connection with the brake operated by an electro-magnet of 500 kilos-centimeters momentum, is provided of such a construction as to enable the operating of the bridge in case of accident to the machinery. For the purpose of a soft setting down of the bridge, or the counter-weights, there are four hydraulic buffers in the lower parts of the towers. They are supplied with the necessary water under pressure by a pipe connecting them with the tanks of about 1.5 cubicmeters capacity, placed on the top of each tower, the tanks being connected together by pipes and filled by an electric-driven rotary pump located in the machinery house. The automatic gates are attached to the towers and connected with the electrical apparatus in such a manner that opening the gates shall only be possible when the bridge is in its lowest position and in the same way the lifting of the bridge shall be impossible as long as the gates are open. Also automatical cut-offs of the electric current in both extreme positions of the bridge are provided.



FILIPINO SAILORS PUTTING TOGETHER UPPER WORKS OF THE SUPERSTRUCTURE, OCTOBER 22D



FILIPINO SAILORS MAKING THE OVERHEAD CONNECTIONS, OCTOBER 29TH

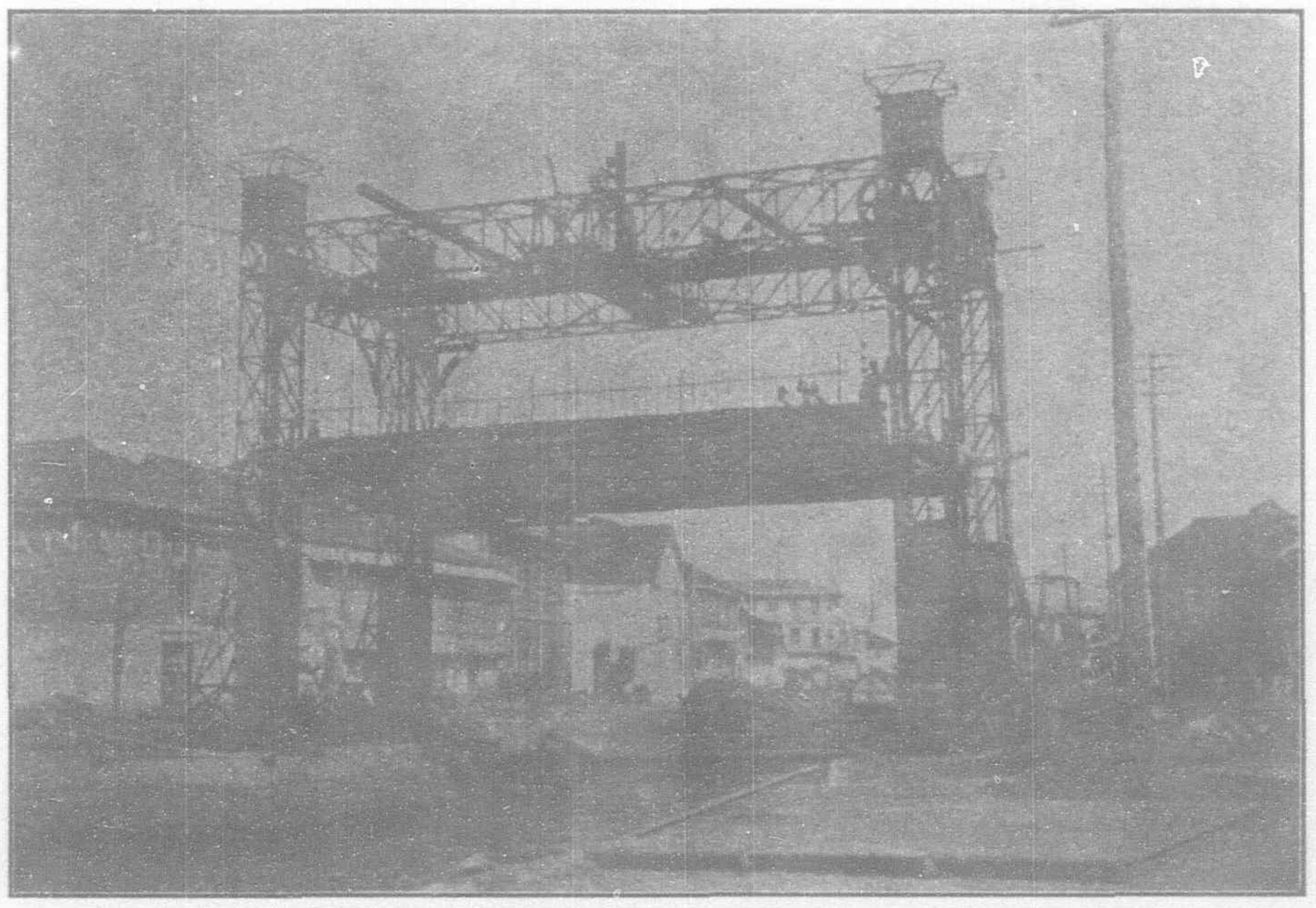
All this is done from one point—the operating house—which is built at the side of the bridge and which contains the very handome switch-board, the starting apparatus, the gates-moving apparatus with the automatical disengaging device in connection, the pump and the electric-motor for same.

The approaches to the bridge have been designated with a maximum gradient of 2.3 per cent and are easy to ascend. They are paved with Australian wood blocks immediately beyond the bridge proper and for a short distance beyond the lines of the sides of the abutments. Calle Prensa is also paved with blocks to Calle Barraca. The estero walls have been raised to grade with concrete and the granite coping stones carried to the intersections with the abutments. The surrounding properties have not been affected by the changes in grade and have in several cases been decidedly improved.

Messr. Germann & Co., Ltd., are well satisfied with the labor done exclusively by natives who once more have proved that, if the Filipinos are guided in the right way, capable and expeditious work can be obtained. As no men familiar with such work could be obtained for the erection of the high structure the contractors made for the first time a trial with natives who had been sailors before, and it was easy to observe that they erected the high structure with intelligent application. Altogether the construction of this bridge was most efficiently accomplished by Messrs. Germann & Co., Ltd., whose reputation for high-class engineering work has long been established.

## TIENTSIN (N. CHINA) CITY IMPROVEMENTS

Municipal improvements are being carried to completion on a large scale at Tientsin, according to *The China Review*. Most of the work is confined to the Native City, but everywhere within boundaries the city is rapidly growing into a clean and orderly place. Says that paper:—This would almost have seemed an utter impossibility 6 or 7 yrs. ago. Everywhere one notices the hustling of busy workmen and the puffing of steam rollers "three at a time" it seems almost; in one vicinity so many do there appear. These heavy monsters of modern roadmaking go crawling slowly round, spluttering and crushin dogwn the prepared stones into a proper state of macadamization. But it would seem that in the city it is not considered necessary to import the usual outfit of the steam roller. The well-known board, bearing the familiar text "Beware of the steam roller!" is markedly absent. So much the better perhaps as the terrifying legend "Beware" seems so much worse than the actual steam roller, which seems a harmless enough reptile if kept at a respectful distance. Here, too, in the aristocratic vicinity of the viceroy's yamen, new houses and shops are being erected; all good brick buildings, and, now the paint is being added, very gay to behold. All the new roads are wide and as well kept as any in the foreign settlements and a great deal better than some of those. Water carts contentedly make their rounds, except on very rainy days, so that not much dust is to be found. One thing, however, the city yet lacks—that is good sanitation. Oh! one's poor nose, how it does ache from the necessary pinching, right down from that magnificent road of the Viceroy's to the poor old Taku-rd where one emerges for a "breather." It forcibly reminds one of the taking of medicine, very much pressed upon one, in early infancy. Even at this cold season the odors of decaying vegetables on the river banks wafted by the breezes are too much for the sensitive nasal organ of a foreigner. However, much has already been done, even on this score, all the old rubbish is rapidly disappearing, and it is too much to expect an achievement like Rome in less than a decade.



CONSTRUCTION OF THE ELEVATOR, NOVEMBER 16TH

## PHILIPPINE ISLANDS (1905-6) BUDGET

The following sums have been appropriated out of the Insular Treasury of the Philippine Government by the civil commission for the service of the government for the fiscal year ending June 30th, 1906:—

Philippine Commission, ₱80,000; executive, ₱114,000.
Executive Bureau, ₱475,000.
Bureau of Civil Service, ₱80,000.
Bureau of Health, ₱902,500.
Bureau of Lands, ₱265,000.
Bureau of Science, ₱315,000.
Bureau of Agriculture, ₱322,800.
Bureau of Forestry, ₱153,000.
Bureau of Quarantine Service, ₱125,000.
Weather Bureau, ₱9,000.
Mining Bureau, ₱9,915.10.
Ethnological Survey, ₱4,951.57.
Philippine Civil Hospital, ₱66,000.
Civil Sanitarium, Benguet, ₱23,250.
Bureau of Constabulary, ₱3,292,000.
Bureau of Public Works, ₱548,003.70.
Bureau of Navigation, ₱1,433,000.
Bureau of Posts, ₱842,000.
Bureau of Port Works, ₱10 *per diem* to United States Army officer detailed in charge of this bureau in lieu of army allowances which said officer may lose by reason of such civil detail, *per diem* effective as of date August 16th, 1905.
Bureau of Coast and Geodetic Survey, ₱175,000.
Signal Service, ₱130,000.
Consulting Architect to the Philippine Commission, salary ₱12,000 *per annum* from September 20th, 1905. and for transportation and incidental expenses, ₱10,000.
Bureau of Justice, ₱839,400.
Bureau of Audits, ₱295,000.
Bureau of Customs, ₱971,500.
Bureau of Internal Revenue, ₱442,000.
Bureau of the Treasury, ₱160,582.
Bureau of Education, ₱2,900,000.
Bureau of Supply, ₱388,000.
Bureau of Prisons, ₱862,500.
Bureau of Printing, ₱416,700.
Bureau of Cold Storage, ₱305,000.
Bureau of Archives, ₱7,268.43.
Bureau of Architecture and Construction of Public Buildings, ₱58,100.
The *Official Gazette*, ₱3,050.
American Circulating Library, ₱1,610.84.
Custodian of the Fortin Building, ₱1,850.
Superintendent of the Intendencia Building, ₱3,748.43
Superintendent of the Oriente Building, ₱3,960.
Custodian of the Santa Potenciana Building, ₱2,460.00
Provisional Government of Benguet, ₱20,000
Provisional Government of Lepanto-Bontoc, ₱29,250.
Provisional Government of Mindoro, ₱44,700.
Provisional Government of Nueva Vizcaya, ₱17,50.0
Provisional Government of Palawan, ₱12,500.
Provisional Government of Zambales, ₱5,000.

The total appropriations for all purposes, including several miscellaneous items which are not enumerated in the foregoing, amount to ₱17,342,061.01.

## TAFT HAS VALUABLE SUPPORT

The Merchant Marine Commission of the United States is supporting Secretary of War Taft in urging that the extension of the coastwise shipping laws of the homeland to the Philippine Islands be indefinitely postponed, that congress grant the Philippines a reduction on sugar and tobacco entering the United States to 25 per cent of the Dingley tariff, and that free trade should be established between the United States and the Philippines after 1909, when the commercial agreement under the Treaty of Paris will have expired with Spain. The Merchant Marine Commission presented its recommendations to congress last month.

# STRONG PLEA FOR THE MODIFICATION OF PHILIPPINE MINING LAWS

In his forthcoming sixth annual report to Commissioner Dean C. Worcester, Secretary of the Interior, Government of the Philippine Islands, Mr. H. D. McCaskey, Chief of the Mining Bureau, will make a strong appeal to the congress at Washington for a modification of the mining laws of the Philippines, showing the urgent necessity of relief to insure the development of the mining industry in the archipelago, which, under more liberal legislation, is destined to prove an important factor in the promotion of prosperity and progress of these possessions under American rule. Mr. McCaskey's report is now in the hands of the public printer, and will cover the operations of his bureau during 1905, before it became a division of the Bureau of Science. By his courtesy THE FAR EASTERN REVIEW has come into possession of advance pages of the report which deal with this important subject, under the caption, *Mining Laws: Urgent Need for Their Modification.* Mr. McCaskey says:

I have the honor to invite your attention to certain sections and provisions of the Act of Congress approved July 1st, 1902, entitled "An act temporarily to provide for the administration of the affairs of civil government in the Philippine Islands, and for other purposes." These sections and provisions constitute portions of the mining legislation at present in force in these Islands, and, by reason of their restrictions, have been subjected to constant complaint and frequent request for their repeal or modification, by interests proposing and attempting the difficult work of development of the mineral resources of the Philippines.

The sections and provisions of the above mentioned act that have been most severely and frequently criticized are as follows:

*Section 33* (entire). This reads as follows: "That no holder shall be entitled to hold in his, its, or their own name, or in the name of any other person, corporation or association more than one mineral claim on the same vein or lode."

*Section 56* (pertaining to coal lands) the last two provisions: "* * * *; and all persons claiming under section fifty-eight shall be required to prove their respective rights and pay for the lands filed within 1 yr. from the time prescribed for filing their respective claims; and upon failure to file the proper notice or to pay for the land within the required period, the same shall be subject to entry by any other qualified applicant."

*Section 75* (pertaining to corporation) the following provisions: "* * *; and it shall be unlawful for any member of a corporation engaged in agriculture or mining and for any corporation organized for any purpose except irrigation to be in any wise interested in any other corporation engaged in agriculture or in mining."

The discussion of these sections and provisions will now be undertaken from the standpoints of my connection of over 5 yrs. with the Mining Bureau and the development of the mineral resources of these Islands, of my observations for nearly 3 yrs. upon the working of these provisions and particularly of *Section 33*, of the complaints and appeals constantly made by prospectors, miners, and others interested in our mineral resources, concerning the application of these severe restrictions under present and local conditions, and finally of some serious study upon my part during these periods concerning these conditions to be dealt with, and the advisability of more liberal legislation at the present time.

*Section 33.*—It has been understood that the Congress of the United States, in its wisdom, provided this section for protection of the natives of these Islands as against exploitation on the part of Americans, or others, "at the expense of the Filipinos" and that for this purpose alone this restrictive measure was deemed necessary at the time, that is, in July, 1902.

It has been a matter of common observation, I believe I may safely state, in these Islands during the past 3 yrs. that no undue or improper efforts have been made, that might have been prevented by *Section 33*, by Americans or others, to exploit mineral lands *at the expense of the Filipinos.* In other words, it has never clearly appeared that natives of these Islands would have suffered injury or loss through the operation of the present mining laws, with *Section 33* omitted entire.

On the other hand the great difficulties of geological exploration and field prospecting, due to the excessive obstacles imposed by the luxuriant forest and jungle growth of the tropics, and by the excessive thickness of soil overlying rock formations; of the present limitations in number of intelligent prospectors and miners; of the great distance from the United States wherein would naturally lie the greater portion of the previous associations and support of this prospecting class; of the consequent difficulty of securing capital; and of the somewhat uncertain political future of these Islands; these difficulties and others have combined to check mineral exploration and development, and the result is that large portions of the Islands have not been covered by prospectors even to the present day. It will therefore be seen that there has been no tendency shown as yet to overdo prospecting in the Philippines nor has capital in any important amount interested itself in this necessary preliminary work. The Filipinos as a race have not been made to suffer during the prospecting and locating already done, and the few cases of claim jumping, common to every mining camp, have been irrespective of race. Finally, whatever contests concerning mining lands have been argued in the courts have been impartially and judicially acted upon.

The purpose and intent of the Congress of the United States, as exhibited throughout the act of July 1st, above quoted, were plainly to protect the people of these Islands against monopolies, corporation rule, and unfair and dishonest acquisition of the public lands, mineral and otherwise. This expression of fair dealing to a people, conquered or acquired, has been followed by the Philippine Commission as well as by the administrations and the Congress of the United States, in spirit and in letter throughout all the formative and constructional work performed in connection with the American occupation of these Islands during the past 5 yrs. This principle of protection of the rights of the Philippines meets with the hearty approval, and wins the active support, it is believed, of all right thinking Americans; and it is not believed that there is any tendency either in the Philippines or elsewhere, to exploit these Islands *at the expense of the Filipinos*, which cannot be met and as completely checked as is possible by legislation, by the Philippine Commission, or by the Philippine Assembly to be elected within a few years. It is believed that it can be shown, furthermore, that with the delegation of the interests of the natives of these Islands to the legislative powers at present representing the United States in the Philippines, there is no present necessity for the continuance of the restrictions of *Section 33*, and that rather, there is grave danger during such continuance, that the mineral resources of these Islands will not be exploited at all, this at the real expense of the Filipinos to whom the greatest ultimate advantages must come by the development of what latent mineral wealth may here be found.

In July of 1902 there was understood to be no court of record competent to pass upon and settle disputes arising over titles to lands, mineral and otherwise, and, at this time following upon the years of Spanish rule, there were found large and valuable portions of public lands claimed under various laws, provisions, and customs, by Spaniards, natives, and others, with titles more or less imperfect, inchoate, or completely void. At this time, and without legislative and judicial protection, particularly for mining claims, such as was urged by my predecessor, the present Hon. Charles H. Burritt, judge of the Court of First Instance, the rights of natives and others to land occupied in good faith by them were in many cases believed to be without legal support. Since the passage of the act of Congress, above freequntly referred to, however, and on November 6th, 1902, the Philippine Commission created a Court of Land Registration with complete power to pass upon land claims and to grant to natives and others, under the admirable Torrens System, the most complete protection for their rights. Since that time also, capital from the United States and elsewhere has been freely invited to develop the system of rapid transportation now successfully completed in Manila, a complete and modern telephone system for Manila and elsewhere, and a thoroughly modern and effective railway system for the entire archipelago. Not only has the commission been empowered to invite bids for development of the City of Manila and of the Islands along these lines but they have also been authorized to encourage single bids, or operations of single corporations constituting, practically, monopolies, for the purposes above set forth. It is pretty generally agreed that it is the part of wisdom thus for them to act. In view of the above statement it is difficult to understand that a corporation or other consolidation of interests, or several of them, in a given mineral district might not safely be encouraged under such regulations and restrictions as the Philippine Commission may in its wisdom deem just. It is not therefore believed that the operation of *Section 33* is at present required upon the ground that it is necessary for protection of the best interests of the natives of the Philippines. Upon the other hand it is the opinion, I think I am justified in saying, of the mining community, and the government alike, that the further operation of this section will be at a loss not only to the American citizens, who have been the potent factors in development in the Philippines, but also to the natives, who suffer precisely the same disadvantages as the Americans from the provisions of *Section 33*, and who can profit no more therefrom.

As the necessity for protection of native rights provided for in *Section 33* does not now arise and as the Philippine Commission have been charged, and have for 5 yrs. exercised their most deliberate thought and greatest wisdom in their legislation, with the protection of native rights, as the natives have now the desired means for securing full and final recognition of land claims of whatever class through the Court of Land Registration, and as there has never been, apparently, but the one motive above assumed for the enactment of *Section 33*, it is respectfully submitted that this section may safely be repealed, thereby delegating to the Philippine Commission which is in thorough touch with local conditions and demands, under *Sections 36, 49,* and *52* of the act above quoted, the increased power following such repeal, to restrict undue appropriation of public lands.

Following an affirmative reply to the question "May *Section 33* safely be repealed?" there arises the further question "*Should* this section be repealed?" It has been the unanimous opinion of natives, foreigners, and Americans, official and otherwise, so for as I have heard opinion expressed upon this subject since the present mining legislation has been in force, that *Section 33 should* be repealed. The reasons for this are not far to seek.

In *Section 21* of the act of July 1st, 1902, the right to explore, occupy, and purchase mineral public lands, is restricted to "citizens of the United States or of said Islands." The most secure and profitable investment of capital in mineral deposits not patented in the Philippines would be that apparently coincident with rights to explore, occupy, and purchase. Up to the present time, during American occupation foreign capital has shown almost no disposition to enter upon development of mineral claims nor has such capital been encouraged so to enter, by legislation or otherwise; up to the present time also, native capital has proved insufficient for the development of even a reasonable proportion of the agricultural resources, except in a most primitive way. It is therefore plainly evident that the capital absolutely essential to the development of the mineral resources of these Islands in a thorough and profitable manner must, under American sovereignty, be expected to come from citizens of the United States. The distance to, and from, the United States is so great that close contact or communication, on the part of capital there, with possible

fields of investment here, is only possible by representation through agencies in the Philippines, and in the case of mineral resources, these agents would naturally be consulting mining engineers, metallurgists, or geologists, as the case may be. The expense of retaining professional men of this class even to report upon mineral fields, is so great that it can only be considered under most favorable conditions; yet capital at the present time is dependent upon its consulting engineers as it is upon its attorneys, and properly so. It is reasonable to assume that no minor representative of capital, still less a consulting engineer, would visit the Philippines for the purpose of investigating and reporting upon the value of any *one* unpatented claim, 1,000 ft. sq., upon any one lode, or several such claims upon as many lodes; and yet no one person, corporation, or association could offer more that is unpatented under the law. It is obviously objectionable for capital to deal, or attempt to deal, with as many persons, corporations, or associations, as it may desire claims; only under exceptional geological conditions could systematic mining methods be followed under such prohibitive conditions as these. It is difficult at present, therefore, to induce capital in the United States even to consider mining in the Philippines. But it requires capital to develop and patent claims; and it is with the unpatented that we are chiefly concerned. It would seem apparent from the above line of thought that capital from the United States will not become interested in unpatented claims under *Section 33*, and that unpatented claims cannot therefore be developed into mines. Exception to this might possibly lie in the case of *bonanza* or exceedingly rich claims; but it is probably unnecessary to add that *bonanzas* are relatively few—certainly they have not yet been discovered in the Philippines, where the richest gold ore have averaged in value from $2 to $50 to the ton. The great majority of the mines of the world are concerned with middle and low grade ores, and Philippine conditions are alike to those of other mining regions in this respect. The greatest skill and professional ability of the modern mining engineer and metallurgist are dedicated today to technical improvements, by which costs may be reduced, and deposits of lower grade may therefore be made profitable to work. An essential to reduction of cost is the opportunity to consolidate claims and work upon a large scale. This is vital with low grade ores. The problem is largely therefore one of *cost*, an economic feature even more severe in mining and in metallurgy than in ordinary business or governmental administration for the reason that in reduction of cost the most expensive professional advice is required, and the natural obstacles are complex and difficult to the highest degree.

In the Philippines the ores are of middle and low-grade and economic problems enter from the first. In addition to this, problems of difficult tropic conditions, labor, transportation, and supplies, must be met, once capital is secured. The topographic, climatic, and geologic feature of the Philippines render prospecting exceptionally difficult, and to these and to other unfavorable conditions may be ascribed the lamentable fact that notwithstanding an occupancy of several hundred years our Spanish and native predecessors succeeded in developing no mines worthy of the name. Resulting from this, the natives of these Islands are neither intelligent prospectors nor miners in the modern sense, and with the exception of a limited number of Igorotes, Bicols, and others, not even primitive mining is done. There is therefore no important mining community among the Filipinos and the interests of mining development are at present largely in the hands of a small number of American miners and prospectors. Were these men to leave the Islands, as many of them have done, the mineral resources would undoubtedly lie undeveloped for an indefinite number of years as there is no mining class among the natives yet bred to take up their work. The future of the mineral industry is believed, therefore, for the present to be dependent upon these hardy, intelligent and invincible American pioneers, who have laboriously blazed the trail, as they and their forbears developed our West. They have penetrated the wilderness and have in five years developed and opened up several promising mining districts that were little known and less developed during all the centuries before they came. They have overcome, and it is believed can overcome, every important obstacle save a lack of sufficient capital to proceed with their work. For several years they have drawn upon their own limited resources and those of their friends in the Philippines; they have now reached that point when capital upon a larger scale is practically an essential to success. They have developed mineral districts, but their finds have largely been in middle grade and low grade ores. The problem of cost of mining and cost of production is a vital factor in their relations with capital, and it is therefore necessary that they be able to offer more, to guarantee the further development required to justify erection of works, than *Section 33* will allow. Extensive deposits of the above class of ores are believed to exist in the Philippines and after 5 yrs. of work in these Islands I am prepared to express my belief that an important and profitable mining industry *can* be built up here with proper encouragement, and this with no menace whatever to the rights of the natives, but rather to their material advantage in all that development and industrial progress must necessarily mean to them.

In their annual reports for 1903 and 1904, the Chief of the Mining Bureau, the Secretary of the Interior, and the Philippine Commission have recommended the repeal of *Section 33*. It is respectfully submitted that this action is now of vital importance to the mining interests of these Islands, that it can be safely taken, and that it should be taken at the earliest practicable time.

*Section 56*.—The provision within this section deemed hostile to early development of coal lands is as given above.

It should be stated here that *literally construed* this provision offers no objection whatever for the reason that *Section* 58 quoted in this provision refers to saline lands alone; and in *Lindley on Mines*, page 1683, this construction is evidently made, as the subject brief of this clause reads: "Saline Claimants, when must pay." As *Sections 53, 54, 55, 56* and *57*, constituting the legislation embraced within the act of July 1st, 1902, for coal lands, are almost literally the *U. S. Revised Statutes 2347, 2348, 2349, 2350*, and *2351*, constituting the present legislation for coal lands in the United States, and as the corresponding restricting clause in *U. S. Rev. Stats. 2350* refers to coal lands mentioned in *U. S. Rev. Stats. 2348*, it is assumed that by taking advantage of an apparent typographical error alone in *Section 56*, can the construction be that the lands referred to are the saline lands of *Section 58*, and not the coal lands of *Section 53*, which section corresponds to *U. S. Rev. Stats. 2348*." The interpretation upon which the following is based is that accepted as the undoubted intent, though not literally expressed or legally binding perhaps, of the law as framed.

Although this provision is in terms the direct adaptation to the Philippines of a federal provision now in force concerning coal lands in the United States (*Rev. Stats. 2350*) it is believed that under Philippine conditions a prescribed period of 1 yr. and 60 ds. is too limited a time within which coal claims must be entered upon, recorded, sufficiently developed to demonstrate their value, and *paid for in full*. Geologic problems upon which values of coal land depend have not yet been satisfactorily solved, and all difficulties relating to capital, as discussed under *Section 33*, apply in this case. Furthermore, the payment for lode claims is extended over a period of 5 yrs., or until such time as accrued assessment work to the value of $500 may have been done upon each lode claim, or until the locator thereof desires to obtain a patent therefor by purchase at a fixed rate of $5 per acre. A locator of a lode is thus given sufficient time within which to prove the value of his claim; whereas the locator of a coal land claim must be satisfied within 1 yr. and 60 ds. after occupation of his claim that he is prepared to pay the prescribed price in full. This involves the expenditure of large amounts of capital for development, surveys, and title within so short a period that under present conditions it is practically prohibitive.

It is respectfully submitted that the coal land laws be revised to the extent that the period for development and payment be extended to at least 3 yrs., or until such time as the public lands involved may have been surveyed and mapped under a system of public land surveys, in harmony with *U. S. Rev. Stats. 2349*, and the practice in the United States, (*Lindley on Mines*, Vol I, §505), said revision delegating to the Philippine Commission such powers as may be required to encourage *bona fide* coal mining and to prohibit mere speculation in land, or monopolistic control.

The coal resources of the Philippines are believed to be extensive and to promise an important supply of steaming coal. The economic features and importance of a home supply are so obvious that they will not be enlarged upon here. The local conditions above referred to are such however that it is believed a coal mining industry must be encouraged by more liberal legislation than at present obtains.

*Section 75*.—The provisions of this section, quoted before, considered inimical to mining development, will in effect so circumscribe corporations as largely to discourage their interest in mining in any form. Furthermore, interests connected with corporation capital "organized for any purpose except irrigation" are prohibited from investing in either agricultural or mining projects which corporations may control.

These prohibitions are particularly severe in view of the fact that a large number of the best and most substantial capitalists are largely involved in corporate interests and that with these profitable and promising mining companies are closely allied as well. Were the interests of the natives or the general public menaced by corporation control or fraud Philippine Commission, it is believed, or the Philippine Assembly, would, by such legislative restriction as may be required, extend to them all protection demanded under such conditions as may arise. This has even now been accomplished in the form of corporation capital invested in rapid transportation within the City of Manila, and of proposed corporation investment in modern telephone and railway development here.

It is respectfully submitted that the corporate interests, being largely the capital interests, should be encouraged under such protective legislation as the Philippine Commission may provide, to assist in the development both of agricultural and of mineral lands. It is believed that this may safely be done without such prohibitive enactment as that above quoted in *Section 75;* and considerations presented under the discussion of *Section 33* are submitted as bearing upon the operation of the restrictive clause of *Section 75* as well.

Additional Legislative Defects.—In addition to the considerations above, and in connection with the proposed draft of an act amending the act of July 1st, 1902, I desire to call your attention to additional important considerations as follows:—*Assessment Work*—(a) Should the time within which coal lands must be paid for be extended to 3 yrs., as urged above, it would seem advisable to require some assessment work corresponding to that upon lode claims and for the same reasons, *i. e.*, to prevent the holding of tracts of land for speculative purposes alone. I would suggest therefore that a total of not more than $200 worth of assessment work for each coal claim held for 3 yrs. be required before a patent be issued therefor. (b) As the Philippine miners have frequently requested specific authority, such as is granted in the federal law of the United States (see *Lindley on Mines*, p. 1167) to group assessment work for several claims in order that annual labor may be performed upon one of a group for the development of the whole, I would urge that a proviso be inserted in the proposed amended act to the effect "that where a group of two or more contiguous lode, coal, or placer mining claims are held in common the annual labor required by law for all in the group may be performed upon any one of them for the development of the group." This, in my opinion, is a most important and valuable addition to the law. *Dredging Claims in Navigable and Tidal Waters*.—In a recent letter to you upon this subject I invited attention to the important fact that after careful study I find there is at present no legislation, apparently, permitting

the mining or dredging for gold or other metals in navigable and tidal waters of these Islands. As many navigable and tidal streams and bays of the Philippines are believed to contain deposits of these metals that may be profitably worked, and as two modern dredging plants are now in Philippine waters for this purpose, I strongly urge the enactment of legislation, based possibly upon the Alaska Code of 1900, whereby these waters may be declared subject to exploration and mining by virtue of licenses to be granted by the Governor General and under such regulations as the Philippine Commission or their successors may provide.

VIEWS OF PHILIPPINE MINING MEN.—In this connection I would state that not only in personal conversation with mining men in the Philippines and in the United States, over a period of 3 yrs., have I been impressed with the unanimous conviction that present restrictions in Philippine mining legislation should be materially modified, if not absolutely repealed, but that upon the occasion of the recent visit to these Islands of the distinguished congressional party accompanying the Secretary of War, this office has received a large number of letters, in response to a circular from this bureau requesting an expression of views upon this subject, strongly advocating prompt repeal of the restrictions mentioned above. These letters are from representative miners, prospectors, business, and professional men, and are unanimous in their appeal for better mining laws; and with their writers I heartily sympathize and agree.

CONCLUSION.—In conclusion attention is respectfully called to the fact that as far back as 1849 President Fillmore, in his first message to congress, recommended that the public mineral lands "* * * be divided into small parcels and sold, under such restriction as to quantity and time as will insure the best price and guard most effectively against combinations of capitalists to obtain monopolies." (*Lindley on Mines*, Vol. I, §48), and that this was followed by the acts of July 26th, 1866, and of July 9th, 1870, which were in turn superseded by the act of May 10th, 1872, now incorporated within the *Revised Statutes* and forming the present federal mining legislation of the United States. In the act of 1866, only, may be found any provision limiting the number of claims that any one person, corporation, or association may hold upon any given vein or lode, and at this time, only, within federal legislation for the United States, was it deemed essential, apparently, to the best interests of the public that such restriction be required. This act was repealed in less than 6 yrs. by the law of May 10th, 1872, now forming the federal mining code. Not until the act of July 1st, 1902, herein frequently referred to, was such restriction again placed within federal legislation, and in this instance for the safe-guarding of the rights of the Filipinos rather than of those of the public at large. No such restriction is known to me in any mining legislation elsewhere and its working may therefore be said to have been observed in the Philippines alone. That this, and other restrictions above noted, should be wholly removed, or materially modified, in the best interests of the development of the resources, and through them of the people of these Islands, I respectfully submit.

## WEI-HAI-WEI GOLD MINING COMPANY, LTD.

At an informal meeting of the shareholders of this company in Shanghai recently, the final report of Mr. W. Denham Verschoyle, who has retired from the management of the mines, was received. The report was as follows:—

While I regret that development is not sufficiently far advanced to enable me to give exact figures about the quantity of ore standing over the 200 ft. level, the reasons for my inability to do so may justly be considered anything but unsatisfactory.

I had hoped by sinking winges from the 100 ft. and drifting on the 200 ft. to open out certain blocks of ore. After the work was well advanced it was found that the sinking was going on the one vein and the drifting on another, the presence of which had not been suspected and which was not sufficiently far away from the other to make the error obvious at first. The net result is therefore that in place of having 3 or 4 blocks cut out and sampled on four sides we have twice the number of blocks cut out on only 2 or 3 sides and therefore insufficiently developed for exact estimation. I shall therefore have to make this report chronicle observed facts, geological and others, and leave it to my successor to give you figures later.

GEOLOGICAL.—Diagram I shows my conception of the system of veins as they appear to be at the 200 ft. level. The country rock was originally granite but has a gneissic structure owing probably more to mechanical causes than flowage The system of veins are of pneumatolyfic origin and therefore unlikely to carry gold and silver in payable quantities. They are very numerous and dip to the E., and are older than any of the others shown. The main dyke dips to the W. and therefore cuts across the series. While cooling, this dyke contracted and various fissures were formed along its walls and across it at various angles and these fissures subsequently formed channels along which ore-bearing liquids could travel and were filled up with quartz and other minerals. There are very distinct evidences that a subsequent twisting movement fractured these smaller veins and opened out large cavities more particularly in the neighborhood of No. 3 shaft, a secondary silicification taking place of apparently very much more importance than the primary from a commercial point of view, in that it has been the cause of the formation of the large ore body here met with. That there was a secondary action is proved by the fact that blocks of the original quartz are often met with, its bluish color and banding being very noticeable among the white massive secondary quartz. That there were large cavities formed by some agency is proved by the beautiful crystallization of the quartz and the large existing cavities met with. That the whole action has been very intense and therefore probably deep-seated is shown by the evidences of metasomatic replacement and the alteration of the country rock about No. 3 shaft, which indeed was my main reason for pushing development in this part of the mine. The principal deductions to be drawn from the facts observed are, that since the fissuring and the filling have been conducted on such a large scale, it is entirely improbable that they are of purely local origin. I think it is quite reasonable to expect that at and below the 300-ft. level you will still have a large body of quartz. There are evidences that this secondary silicification will extend further to the N. as the workings go down and this is likely to have a most important bearing on the values, which appear to be more regular where this action has taken place.

ORE TONNAGE AND VALUES.—For the reasons given above it is impossible to go into this question with the proper degree of exactitude. The following figures, I think, will prove to be a very conservative estimate:

Above 200 ft. level.

| | | |
|---|---|---|
| Dumps | 3,000 | *Tons.* |
| Broken in Stopes | 700 | " |
| No. 1 Vein | 2,000 | " |
| " 2 " | 4,000 | " |
| " 3 " | 2,700 | " |
| " 3 Shaft | 7,300 | " |
| Total | 19,700 | |

Every foot we go S. from No. 3 shaft adds very largely to this reserve and at present we have absolutely no data as to the limits in that direction.

It is a very noticeable feature of our year's development that while we had only about 100 ft. of ore on the 100-ft. level, we have already passed through 270 ft. of ore on the 200-ft., and I can at present see no reason why a further improvement may not be expected on the 300-ft. The above reserve gives us ore for 9 mos.' milling and as within 2 mos. we should be breaking ore on the 300-ft. and within 8 mos. on the 400-ft., it looks like we should be able to keep the mill busy for some time to come.

THE CHAIRMAN —So that the quantities of ore give us every hope for the future and in my interview with Mr. Cole, our new manager, he entirely confirms all Mr. Verschoyle has written and says he himself is satisfied that we have a large quantity of ore that we shall be able to put through our mill. That is the subject of the quantities of our ore; we shall come to their values next.

VALUE.—The report proceeds:—Since we have a considerable tonnage of both very low grade and high grade ore it is obvious that we can mix them to produce almost any grade required. As our reserve are not large every endeavor possible should be made to work as low a grade ore as possible, at least for the 1st yr. The cost of mining and treating a ton of ore, if arrived at carefully, will give a basis for calculation. In my May report I gave the following figures and I can see no reason for altering them at present.

| | | |
|---|---|---|
| Mining (inc. development) | $1.00 | (*gold*) |
| Sorting | 05 | " |
| Milling | 98 | " |
| Cyaniding (see below) | 20 | " |
| General | 50 | " |
| | $2.73 | (*gold*) |

I admit that it will require close management to reach this figure, but at the same time I am confident that a lower figure can be reached and therefore I think $2.73 can be taken as a basis for figuring.

Any ore worth over $2.73 will pay to put through. In 3 mos. from now it will be easier to judge what can be done. The dump has been roughly sorted and careful sampling gives $5 assay value. If there are values going out on the waste dump this is too closely sorted and on the other hand if ore is coming in well on the 300 and 400 it might be politic to sort still closer, and send in $6 or $7 ore to the mill and thus work out our at present available reserves in 6 mos. There is however absolutely no doubt in my mind as to what is our present policy. It is—to cut down every cent of unnecessary expense and work the lowest grade ore that will yield a profit.

TREATMENT.—I think it is unnecessary to place on record the details of my experiments for the last few months. The main final conclusion I have arrived at is that the ore is amenable to cyanide treatment and that the best results are obtained by fine grinding and agitation. It would however be most unwise to think of erecting any plant without further experiment and this can best be carried out whilst the mill is in operation and there are plenty of concentrates to work on. It will not be a question of treating the whole pulp as it comes from the mill. Most of the values are contained in the concentrates about 5 to 10 per cent of the whole. It will therefore be a question of regrinding 10 tons in every 100 put through the mill from 30 or 25 mesh down to 300-150 and treating the resultant fines by agitation and filter pressing. Unless certain minerals appear in the ore, this can be done for about $2 per ton of concentrates under the most favourable circumstances. However we can hardly expect so high a percentage of concentrates and the cost of treatment will probably run higher so that for present purposes we may take 20 per ton of ore milled as the cyaniding cost. Until final determination can be arrived at on this point there is no question that the wisest course will be to ship the concentrates to a smelter. This will give returns from the concentrates in from 6 to 8 w. after starting the mill without any heavy outlay for new plant. My experiments show that we may expect to save 20 per cent of the values on the plates at the mill. A $2.85 freight rate from the mill to the steamer has been arranged. We have quotations for freights to America at $8 and smelting charges at $10. Treating 100 tons of $5 (gold) ore having 7 per cent of concentrates and allowing $1 tailings will thus work out somewhere as follows:

100 tons @ $5 (gold)=$1000 *Mex.*
less $1 tailings=$900 "

COSTS.

| | |
|---|---|
| Mining, milling, etc. 100 tons | =$506 (*Mex.*) |
| Bags, bagging, drying 7 tons conc | = 47 |
| Land freights 7 tons conc | = 19.95 |
| Ocean freights 7 tons conc | = 56 |
| Smelter charges and deductions conc | = 106 |
| Insurance, sampling, general, conc | = 20 |
| | $754.95 |

RETURNS.

| | |
|---|---|
| 20 per cent of total value, saved on plates | $200 |
| Saved by smelter | 700 |
| | $900.00 |
| Less charges | 754.95 |
| Profit on 100 tons | $145.05 |

It must be remembered that these figures are only approximations, as excepting land freights no contracts have been entered into. Also no account is taken of copper as it is questionable whether there will be more than the smelter minimum allowance.

It will be noted that the total cost under this system is $7.54 (Mex.) per ton of ore delivered to mill. Allowing $5.06 (Mex.) for all charges except treatment of concentrates, and allowing even as high as $1 per ton of ore mined for cyaniding, we would still make a further $1.48 per ton profit, by installing this process. It is obvious therefore that exhaustive tests should be entered upon at once and a suitable plant erected as soon as definite results have been obtained. The experiments already made show that the ore can be treated, but this is only the first step and the easiest. The elaboration of the working process will take time and much careful thought.

MANAGEMENT.—This is a question that requires as much consideration as any other in the operation of a mine. It is imperative that we should work the very lowest grade ore upon which a profit can be made, since our reserves are low. This means that costs must be cut wherever possible. Take the case of dynamite. This costs us now 80 cts. per lb. and we use say 1,250 lbs. per mo. that is $1,000 per mo. Other mines are using the same dynamite, purchased under contract, at 40 cts. per lb. If we mill 2,000 tons per mo. dynamite has cost 50 cts. per ton and should have cost only 25 cts. which would mean that we should have to leave ore standing in the mine which under other circumstances could be mined at a profit. Fuse, caps, candles, steel, etc., are all subject to the same attention. There is only one possible system under which this end can be obtained and that is to transfer the whole business of buying and contracting for supplies to the mine office, where there is a man whose duty it is to attend to all such details. The success or failure of the mine depends very largely on this point, for no man who has a reputation at stake will take hold unless it is conceded.

In conclusion I would say that whilst I have been unable to give the full details that would be possible in another 3 mos., I think that sufficient has been written to show that I have confidence in the future of the mine. There is rich ore in the mine, but as a whole it is a low grade proposition and must be handled as such. As to reserves it is well to remember that whilst they are still small, 9 mos. ago there were none at all, and the work which is necessary to open up more is already well advanced.

The mine is now I hope on the high road towards the dividend paying stage and I therefore resign from its management with feelings of professional satisfaction.

## ORIENTAL CONSTRUCTION COMPANY

The Oriental Construction Company has taken out incorporation papers and will in a short time be known as the Oriental Construction Company, Ltd. The capital stock is $200,000, none of which is offered for sale. Representatives of the company have been in Manila for several weeks looking into the possibilities of the various proposed public works which will be inaugurated during this year, and while their work has up to the present been confined chiefly to China, it is the intention now, to open an office in Manila and reach out for a share of the many projects proposed or now under way in the Philippine Islands. The office will temporarily be located in the McCullough Building and Mr. McCullough, who is one of the Directors of the Company, will attend to business matters until the regular staff will be sent over from the Head Office at Hongkong.

# PROPOSALS AND CONTRACTS FOR THE GRAVITY WATER SUPPLY AND SEWER SYSTEMS, MANILA

Proposals to furnish material and construct a gravity water supply system for Manila, P. I., were submitted to the Municipal Board of this city at noon, January 2d, (Mr. J. F. Case, M. Am. Soc. C. E., Chief Engineer, Department of Sewer and Waterworks construction). There were six bids in all, offered by the following engineering and contracting concerns:—

J. G. White & Co. (Inc.), New York and Manila; Atlantic, Gulf and Pacific Company (Inc.), New York and Manila; Schaw-Batcher Company, Sacramento, Cal.; Matson, Lord and Belser Company, San Francisco and Honolulu; Delmar W. Smith, Manila, and H. W. Peabody & Co., New York and Manila.

The bids of the four companies first named covered the entire work as a whole and by sections, the aggregate total of their respective bids being as follows, all amounts expressed in United States currency:—

| | |
|---|---|
| J. G. White & Co. (Inc.) | $1,196,853.50 |
| Atlantic, Gulf and Pacific Company | 1,071,940.00 |
| Schaw-Batcher Company | 1,067,032.00 |
| Matson, Lord and Belser Company | 1,040,729.35 |

Delmar W. Smith's bid covered all the work with the exception of furnishing steel plates and steel rivets and the manufacture and laying of steel pipe, the total amount of his bid being $754,090. H. W. Peabody & Co.'s bid was confined to furnishing steel plates and rivets, and involved $99,900.31. The general specifications under which the bids were submitted contained a clause to the effect that the work called for "will preferably be let as a whole, but may be let separately in (the following) divisions if deemed advantageous to the city." While the bid of J. G. White & Co. appears to be something like $120,000, in round figures, higher than the next highest bid on the whole work, there was a clause in that firm's proposal which submitted that if the contract for the whole work was given to it, the firm would make a reduction of $100,000 from the cost in the bid. This brings the actual bid of Messrs. J. G. White & Co. on the whole work down to $1,096,853.50, and places that firm's consolidated proposal within reasonable range of the next highest proposal.

The proposal of the Atlantic, Gulf and Pacific Company contained a clause to the effect that if it were awarded the contract for the construction of the dam, separately, the sum of $72,000 should be added to its bid on Section A.

Owing to a complication which arose over the proposal of Mr. W. J. Schmidt in behalf of the Schaw-Batcher Company, the final award of the contracts was delayed until the afternoon of January 9th. Then the matter was finally disposed of. In the meantime the Municipal Board learned upon investigation that Mr. Schmidt had no authority whatever to bid in the name of the Schaw-Batcher Company and that the Sacramento concern positively refused to sign any contract with the city which might be secured by Mr. Schmidt. The company's arrangement with him covered selling pipe only In view of this the board rejected the proposal submitted by Mr. Schmidt, and then adopted the following resolution:—

"That the bids for the construction of the gravity water supply for the City of Manila be accepted and contracts awarded in accordance with the following schedule: For the construction of the dam (Section A) and reservoir (Section E), to the Matson, Lord and Belser Company; for furnishing steel plates and rivets (Section B), to H. W. Peabody & Co.; the manufacture and laying of steel pipe (Section C) and the construction of the tunnel (Section D), to the Atlantic, Gulf and Pacific Company."

As the awards now stand the entire work will cost the city $1,025,810.76, apportioned to the several sections distributed among the contractors, as follows:—

| | |
|---|---|
| Section A. | $241,510.25 |
| " B | 99,900.31 |
| " C. | 281,935.00 |
| " D. | 179.987.50 |
| " E. | 222,477.70 |

The estimates of the bidding contractors as submitted in their proposals were a high compliment to Chief Engineer Case's thorough technical knowledge of the proposed work as shown in his estimate of the cost of the new water supply construction to the city. His estimate was $1,104,000 or only $63,000 higher than the lowest bid for the entire system. Throughout the entire bidding Mr. Case had to deal with most competent engineers whose years of experience in estimating just such work was focussed upon the position held by Mr. Case. Some persons believe that the whole contract should have gone to the Matson, Lord and Belser Company, it being the lowest bidder on the whole work, but the chief engineer decided that it would be more advantageous to the city to let sectional contracts, and in the Municipal Board so doing it is estimated that the municipality has saved in round figures about $15,000 on the manufacture and laying of steel pipe and the construction of the tunnel alone. Originally the contract for the manufacture and laying of steel pipe was given to the Schaw-Batcher Company on figures submitted by Mr. Schmidt, but when it was discovered that that gentleman had no authority to involve his company in a contract, this section of the work was transferred to the Atlantic, Gulf and Pacific Company, which was the next lowest bidder for same. On the opposite page details of the bids are given in form for ready reference and comparison.

## PROPOSALS FOR SEWER CONSTRUCTION

The Atlantic, Gulf and Pacific Company, Inc., was the successful bidder for the contract to construct the sewer system for the City of Manila, P. I. The estimate of the cost of this work, made by the Chief Engineer, Department of Waterworks and Sewer Construction, was $1,600,900 gold, and the bid of the Atlantic, Gulf and Pacific Company totalled up to $1,631,053.20, or $30,153.20 in excess of Mr Case's estimate.

There were two other proposals presented to the Municipal Board for consideration—one from the Matson, Lord and Belser Company, amounting to $1,650,789.82, and the other from the Colonial Construction Company, amounting to $1,701,591.10. The Colonial Construction Company is a branch of a Kansas City sewer contracting firm organized in Manila for the purpose of bidding on this work, and was represented at the opening of the proposals by Delmar W. Smith. The bids were opened at 12 o'clock (noon), January 12th.

Each bid was composed of forty-eight separate items and each item was separately bid on. The first important item in which any great difference was noted in the bids was the section relative to the piles. The Atlantic Gulf and Pacific Company won here easily on account of its greater facilities and the machinery it has already on the spot suitable for pile driving. There are 61,000 lin. ft. of piling to be supplied. The Atlantic Gulf people offered this piling at the rate of 75 cts. per lin. yd., or $45,750. The Matson, Lord and Belser Company was the next lowest bidder with an offer of $54,920, or 89 cts., and the Colonial Construction Company made it 99 cts. per lin. ft., or $60,390.

For capping and driving piles, the Matson, Lord and Belser Company offered the construction for $101.25 per 1,000 ft., the bid of the Atlantic, Gulf and Pacific Company being $60 per 1,000 ft.

Another item in which there was a considerable difference in bids was in the laying pipes across the Pasig River. The bid of the Atlantic, Gulf and Pacific Company was $30 per ft.; that of Matson, Lord and Belser Company, $50, and the Colonial Construction Company $38.71.

For the 330,000 yds. of excavation the bid of the Atlantic, Gulf and Pacific Company was $1.59 per cu. yd., or $52,470; that of the Colonial Construction Company $1.69 per cu. yd., or $55,770, and that of the Matson, Lord and Belser Company $1.76 per cu. yd., or $58,080.

For the concrete work the Matson, Lord aud Belser people were by far the lowest bidders. Of this work there is 19,600 yds. to be done and this company offered to do it for $8.86 per cu. yd., or $172,656; the Atlantic, Gulf and Pacific Company $10 per cu. yd., or $196,000, and the Colonial Construction Company at $14.90, or $292,040.

For the supply of the 164,480 ft. of 8-in. iron piping the Atlantic, Gulf and Pacific Company bid 60 cts. per ft., the Colonial Construction Company 67 cts., and the Matson, Lord and Belser Company 73 cts.

Details of the bids are to be found on page 212 of this issue.

## JAPAN'S BUDGET, 1905-6

Following is a condensed statement of Japan's proposed finances for the current fiscal year:—**Ordinary Budget**—Ordinary revenue, -Y-227,109,280; extraordinary revenue, -Y-19,949,714. Total, -Y-247,058,994. Ordinary expenditure, -Y-182,044,344; extraordinary expenditure, Y-53,000,522. Total, -Y-235,044,866. Balance (surplus of revenue), -Y-12,014,128. **War Budget**—Revenue for war taxes, -Y-163,459,947; extraordinary revenue concerning the war, -Y-9,898,058. Total, -Y-173,358,005. **Expenditure**—Expenditure concerning the war, -Y-173,-438,280; extraordinary expenditure concerning the war, -Y-81,606,591. Total, -Y-255,044,871. Balance (deficit of revenue), -Y-81,686,876. **Resources for Making Good the Deficit**—Surplus in Ordinary Budget, -Y-12,014,128; surplus over the ordinary expenditure of the War Office in the Ordinary Budget, -Y-3,145,711; loans to be issued, -Y-36,541,165. Total expenditures of Ordinary and War Budgets, -Y-490,089,747. **Further Expenditures**—Withdrawal of the field army, -Y-380,000,000; further expenditure of the navy, -Y-20,000,000; gifts to soldiers and sailors, -Y-150,000,000. Total, -Y-550,000,000. As extra resources to meet the expenditure, the unexpended balance of the proceeds of the loans issued at London, amounting to -Y-150,000,000 is available. The gifts to soldiers and sailors amounting to -Y-150,000,-000 are to be paid in loan bonds. The total of the above two sums, -Y-300,000,000 being subtracted from -Y-550,000,000, there remains -Y-250,000,000 which will be raised by issuing domestic loans, as is the case with the sum of -Y-660,000,000 odd mentioned in connection with the War Budget.

## REVIEW

The initial number of *The Philippine Journal of Science* has come to our exchange table from the Director of the Bureau of Science, and we find that it contains a volume of most interesting matter covering certain scientific research which has been pursued by the specialists in that bureau. In his introductory remarks Paul C. Freer, M. D., Ph. D., Director of the Bureau of Science and editor of *The Journal*, says that "this periodical will contain original articles by members of the bureau staff as well as by others who, in the Philippine Islands or adjacent countries of the Orient, are doing scientific work of the proper character. *The Journal* will thus have the unique function of expressing the united scientific results achieved in contiguous countries situated in the Tropics. With the growing interest which is being taken not only in tropical medicine, but in the agricultural and mineral resources of these regions, it seems certain that a publication of the character which is proposed will secure a large number of readers." We extend to *The Philippine Journal of Science* a most cordial welcome to the field of the Fourth Estate in the Orient. The superior excellence of the first number can not help but appeal to the scientific investigators all over the Far East. It is finely printed, artistically arranged and well illustrated. Probably the most interesting papers from a commercial and industrial standpoint which appears in this issue are those *On the Water Relations of the Cocoanut, Palm*, by Mr. Edward Bingham Copeland, of the botanical section of the biological laboratory, Bureau of Science, and *The Cocoanut and its Relation to the Production of Cocoanut Oil*, by Mr. Herbert S. Walker, of the chemical laboratory, Bureau of Science. A review of the latter paper which deals with the commercial phase of the cocoanut, will be found on other pages of this issue of THE FAR EASTERN REVIEW.

## Bids Opened at Manila, Philippine Islands, January 2d, 1906, by the Municipal Board, for Furnishing Material for and the Construction of a Gravity Water Supply for the City.

(J. F. CASE, M. Am. Soc. C. E., Chief Engineer, Department of Sewer and Waterworks Construction)

### Contract A.—Dam.

| Item | Unit | Quantity | J. G. WHITE & CO. NEW YORK-MANILA. Price | J. G. WHITE & CO. Amount | MATSON, LORD & BELSER CO. SAN FRANCISCO-HONOLULU. Price | MATSON, LORD & BELSER CO. Amount | ATLANTIC, GULF & PACIFIC CO. NEW YORK-MANILA. Price | ATLANTIC, GULF & PACIFIC CO. Amount | SCHAW-BATCHER COMPANY. SACRAMENTO, CAL. Price | SCHAW-BATCHER COMPANY. Amount | DELMAR W. SMITH. MANILA. Price | DELMAR W. SMITH. Amount | H. W. PEABODY & CO. NEW YORK-MANILA. Price | H. W. PEABODY & CO. Amount |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1—Earth excavation, CLASS A. | cub. yd. | 1,000 | 0.77 | $ 770.00 | 0.518 | $ 518.00 | 0.50 | $ 500.00 | 0.50 | $ 500 00 | 0.43 | $ 430.00 | | |
| 2—Earth excavation, CLASS B. | " | 500 | 1.03 | 515.00 | 1.23 | 615.00 | 2.00 | 1,000 00 | 0.50 | 250.00 | 0.60 | 300.00 | | |
| 3—Loose-rock excavation. CLASS C. | " | 1,600 | 1.54 | 2,464.00 | 1.18 | 1,888 00 | 0.50 | 800.00 | 0.75 | 1,200.00 | 0.70 | 1,120.00 | | |
| 4—Loose-rock excavation. CLASS D. | " | 400 | 1.72 | 688.00 | 2.07 | 828.00 | 2.00 | 800.00 | 0.75 | 300.00 | 1.00 | 400.00 | | |
| 5—Solid-rock excavation. CLASS E. | " | 11,000 | 1.92 | 21,120.00 | 34.85 | 28,335.00 | 1.00 | 11,000.00 | 2.00 | 22,000.00 | 1.95 | 21,450.00 | | |
| 6—Solid-rock excavation. CLASS F. | " | 500 | 2.28 | 1,140.00 | 4.05 | 2,025.00 | 4.00 | 2,000.00 | 3.00 | 1,500.00 | 2.70 | 1,350.00 | | |
| 7—Solid-rock excavation without blasting, CLASS G. | " | 500 | 12.25 | 6,125.00 | 8.15 | 4 075.00 | 4.00 | 2,000 00 | 4.00 | 2,000.00 | 4.50 | 2,250.00 | | |
| 8—Rubble concrete masonry | " | 23,000 | 7.00 | 161,000 00 | 7.10 | 163,300 00 | 7.85 | 180,550 00 | 9.50 | 218,500.00 | 9.90 | 227,700.00 | | |
| 9—Facework of rubble concrete masonry | sq. yd. | 3,600 | 27.12 | 97,632 00 | 3.19 | 11,484.00 | 5.00 | 18,000.00 | 3.00 | 10,800 00 | 3.00 | 10,800.00 | | |
| 10—Riprap in place | cub. yd. | 1,200 | 3.50 | 4,200.00 | 2.75 | 3,300.00 | 2.00 | 2,400.00 | 1.00 | 1,200.00 | 1.25 | 1,500.00 | | |
| 11—Portland cement concrete masonry, 1:2½:5 | " | 300 | 11.46 | 3,438.00 | 11.75 | 3,525.00 | 7.00 | 2,100.00 | 12.00 | 3,600.00 | 12.00 | 3,600.00 | | |
| 12—Concrete gate well lining | " | 206 | 14.00 | 2,884.00 | 14 35 | 2,956.10 | 10.00 | 2,060.00 | 12.00 | 2,472 00 | 12.00 | 2,472.00 | | |
| 13—Brick masonry gate well lining | " | 206 | 23.00 | 4,882.20 | 30.75 | 6,334.50 | | | 14.00 | 2,884.00 | 18.00 | 3,708.00 | | |
| 14—Gatehouse at dam, one, complete. | | | | 16,000.00 | | 6,480.00 | | 5,000.00 | | 9,000 00 | | 6,900.00 | | |
| 15—Hauling, caring for, placing iron, etc. | ton | 45 | 38.50 | 1,732.50 | 48 47 | 2,181.15 | 40.00 | 1,800.00 | 20.00 | 900.00 | 18.00 | 810 00 | | |
| | | | | $ 321,706.70 | | $ 244,888.65 | | $ ..... | | $ 274,634.00 | | $ 282,318.00 | | |
| Total omitting item 12 | | | | $ 319,708.50 | | * $ 241,510.25 | | ‡ $ 230,010.00 | | $ 274,222 00 | | $ 281,082.00 | | |
| " " " 13 | | | | | | | | | | | | | | |

### Contract B.—Furnishing steel plates and rivets.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 18—Steel plates | lb. | 5,300,000 | 0.02 | $ 106,000.00 | 0.0184 | $ 97,520.00 | 0.0197 | $ 104,410 00 | 0.02 | $ 106,000.00 | | | .017836 | $ 94,530.80 |
| 19—Steel rivets | " | 155,00 | 0.05¾ | 8,912.50 | 0.03 | 4,650.00 | 0.036 | 5,580.00 | 0.03½ | 5,425.00 | | | .034642 | 5,369.51 |
| Total | | | | $ 114,912.50 | | $ 102,170.00 | | $ 109,990 00 | | $ 111,425.00 | | | | * $ 99,900.31 |

### Contract C.—Manufacturing and laying steel pipe.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 20—Earth excavation and refilling | cub. yd. | 58,500 | 0.78 | $ 45,630.00 | 0.506 | $ 29,601.00 | 0.61 | $ 35,685.00 | 0 50 | $ 29,250.00 | | | | |
| 21—Loose-rock excavation and refilling | " | 1,000 | 1.24 | 1,240.00 | 0.60¾ | 607.50 | 1.00 | 1,000.00 | 1.00 | 1,000 00 | | | | |
| 22—Solid-rock excavation and refilling | " | 9,000 | 2.29 | 20,610 00 | 1.48½ | 13,365.00 | 1.50 | 13,500.00 | 1.90 | 17,100.00 | | | | |
| 23—Adobe-stone excavation and refilling | " | 7,500 | 1.18 | 8 850.00 | 1.21½ | 9,112 50 | 1.00 | 7,500.00 | 1.50 | 11,250.00 | | | | |
| 24—Manufacturing, etc, 42" steel pipe | lineal foot | 55,800 | 3.56 | 198,648.00 | 3 82 | 213,156.00 | 3.75 | 209,250.00 | 3.00 | 167,400.00 | | | | |
| 25—Furnishing, etc, 36" C. I. pipe under Mariquina river | " | 450 | 24.50 | 11,025.00 | 46.62 | 20,979.00 | 20.00 | 9,000.00 | 16 00 | 7,200.00 | | | | |
| 26—Furnishing and laying 6" waste pipe, No. 14 B.W.G. | " | 1,000 | .65 | 650.00 | 3.37½ | 3,375.00 | 0.50 | 500.00 | 1.00 | 1,000.00 | | | | |
| 27—Portland cement concrete masonry 1:2½:5 | cub. yd. | 200 | 9.30 | 1,860.00 | 13.75 | 2,750.00 | 20.00 | 4,000 00 | 10 00 | 2,000.00 | | | | |
| 28—Portland cement concrete masonry 1:4:10 | " | 150 | 6.88 | 1,092.00 | 8.80 | 1,320.00 | 10.00 | 1,500.00 | 10.00 | 1,500.00 | | | | |
| 28a—Hauling Iron, etc. | ton | | 40.00 | | 48.47 | | 40.00 | | 20.00 | | | | | |
| Total | | | | $ 289,515.00 | | $ 294,266.00 | | * $ 281,935.00 | | † $ 237,700.00 | | | | |

### Contract D.—Tunnel.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29—Earth excavation in open trench | cub. yd. | 1,050 | .78 | $ 819.00 | 0.69 | $ 724.50 | 0.75 | $ 787.50 | 0.50 | $ 525.00 | 0.30 | $ 315.00 | | |
| 30—Borrowed earth for embankment | " | 16,000 | .78 | 12,480.00 | 0.55 | 8,800.00 | 0.75 | 12,000.00 | 0 50 | 8,000.00 | 0.50 | 8,000 00 | | |
| 31—Rock excavation in open trench | " | 2,400 | 4.35 | 10,440.00 | 1.24 | 2,976.00 | 2.00 | 4,800.00 | 2.00 | 4,800.00 | 1.70 | 4,080.00 | | |
| 32—Tunnel excavation | " | 17,500 | 6.10 | 106,750.00 | 6.10 | 106,750.00 | 6.70 | 117,250 00 | 6.50 | 113,750.00 | 5.90 | 103,250.00 | | |
| 33—Concrete lining for tunnel | " | 3,500 | 12.35 | 43,225.00 | 10.00 | 35,000.00 | 6.00 | 21,000.00 | 12.00 | 42,000 00 | 14.50 | 50,750.00 | | |
| 34—Plaster coat on unlined sections | sq. yd. | 37,500 | 40 | 15,000.00 | 0.63 | 23,625.00 | 0.50 | 18,750 00 | 0.30 | 11,250 00 | 0.50 | 18,750,00 | | |
| 35—Concrete masonry for chambers, culverts etc | cub. yd. | 270 | 12.35 | 3,334.50 | 9 00 | 2,450 00 | 20.00 | 5,400.00 | 12.00 | 3,240 00 | 12.00 | 3,240 00 | | |
| Total | | | | $ 192,048.50 | | $ 180,305 50 | | * $ 179,987.50 | | $ 183,565.00 | | $ 188,385.00 | | |

### Contract E.—Reservoir and gatehouse.

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 36—Earth excavation | cnb. yd. | 29,000 | .33 | $ 9,570.00 | 0.64 | $ 18,560 00 | 0.20 | $ 5,800.00 | 0.50 | $ 14,500 00 | 0.30 | $ 8,700 00 | | |
| 37—Rock excavation | " | 235,000 | .95 | 223,250.00 | 0.64 | 150,400.00 | 0 89¼ | 209,737.50 | 0 85 | 199,750.00 | 0 95 | 223,250.00 | | |
| 38—Plaster coat for reservoir | sq. yd. | 43,500 | .38 | 16,530.00 | 0.55 | 23,925.00 | 0.60 | 26,100 00 | 0.10 | 4,350.00 | 0.35 | 15,225 00 | | |
| 39—Concrete masonry lining | cub. yd | 200 | 8.48 | 1,696.00 | 9.18 | 1,836.00 | 12.00 | 2,400 00 | 10 00 | 2,000.00 | 10 50 | 2,100 00 | | |
| 40—Concrete masonry in parapet walls | " | 325 | 8.70 | 2,827.50 | 9.20 | 2,990 00 | 10.00 | 3,250 00 | 12.00 | 3,900.00 | 12.00 | 3,900.00 | | |
| 41—Concrete masonry in gate chambers and core walls | " | 1,650 | 7.67 | 12,655.50 | 8.75 | 14,437 50 | 10 00 | 16,500.00 | 12.00 | 19,800.00 | 14 50 | 23,925.00 | | |
| 42—Gatehouse at reservoir, one complete | | | | 12,500.00 | | 8,640.00 | | 5,000.00 | | 15,000.00 | | 6,500.00 | | |
| 43—Hauling, etc., iron & metal work in gatehouse and reservoir | ton | 41 | 40.00 | 1,640.00 | 41.20 | 1,689.20 | 30.00 | 1,230.00 | 20.00 | 820.00 | 25.00 | 1,025.00 | | |
| | | | | $ 280,669.00 | | * $ 222,477.70 | | $ 270,017.50 | | $ 260.120.00 | | 284,625.00 | | |
| Total | | | | $ 1,196,853.50 | | $ 1,040,129.35 | | $1,071,940 00 | | $ 1,067,032.00 | | $ 754,090.00 | | $ 99,900.31 |
| Aggregate total | | | | | | | | | | | | | | |

* Successful bids. † Rejected bids. ‡ If Section A is awarded separately $72,000 is to be added to this bid.

# Details of Proposals Opened at Noon, January 12th, 1906, by the Municipal Board of Manila, Philippine Islands, for the Construction of a System of Sewers and Appurtenances for the City.

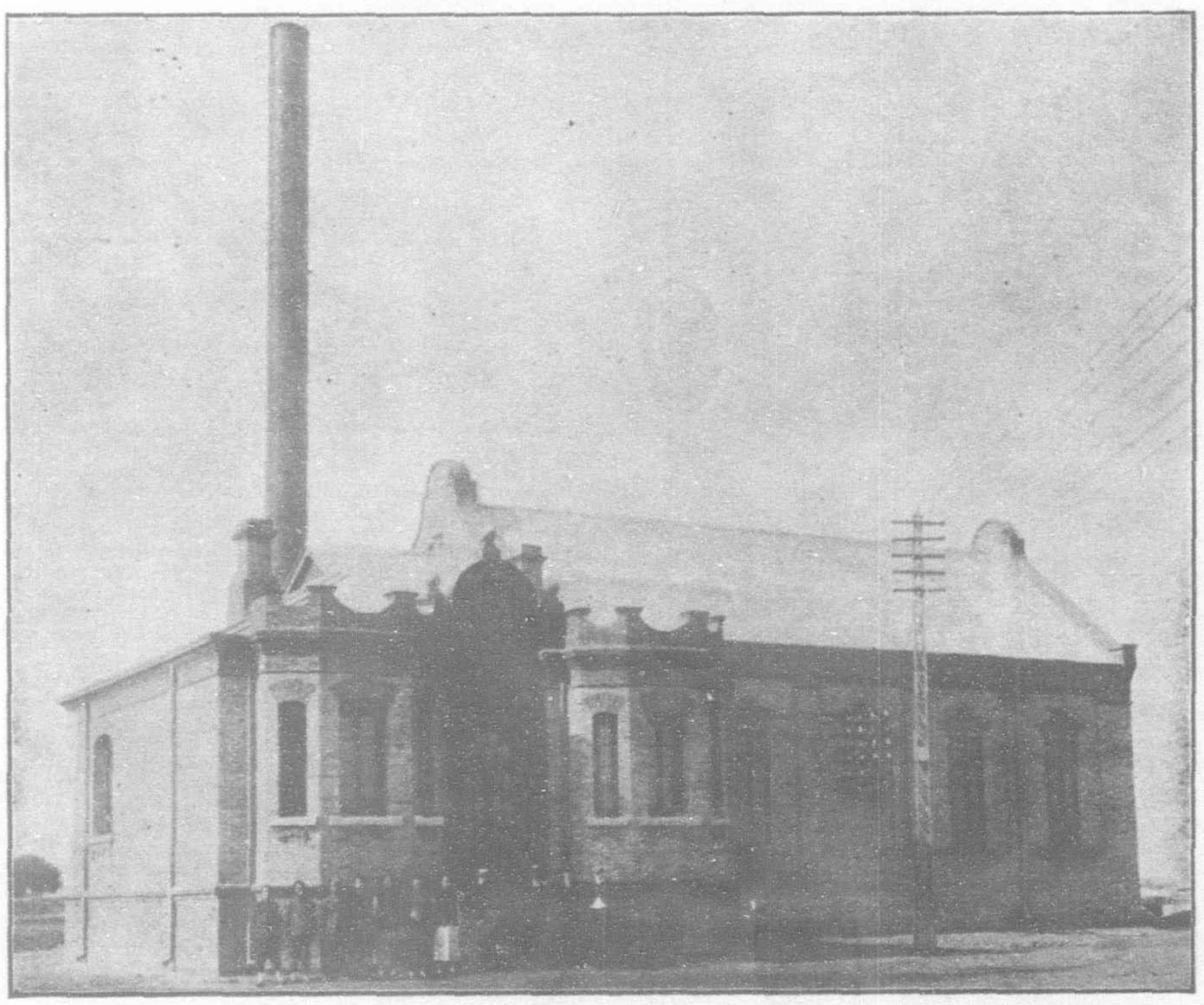
(J. F. CASE, M. Am. Soc. C. E., Chief Engineer, Department of Waterworks and Sewer Construction)

| | QUANTITIES | | ATLANTIC, GULF AND PACIFIC CO. NEW YORK-MANILA | MATSON, LORD AND BELSER CO. S. FRANCISCO-HONOLULU | COLONIAL CONSTRUCTION CO. KANSAS CITY-MANILA |
|---|---|---|---|---|---|
| 16″ C. I. Pipe, 4 Specials, 1 Bend [¼] 156′ | 11 tons. | $ | 40.00 | $ 40.00 | $ 49.75 |
| 18″ " , 8 " 3 " [¼] 310′ | 27 " | | 40.00 | 41.28 | 49.75 |
| 24″ " . 3 Bends [¼] 70′ | 9 " | | 40.00 | 49.41 | 49.75 |
| 24″ " , flexible joint, 16 Specials 1120′ | 219 " | | 65.00 | 56.21 | 49.75 |
| 30″ " 136′ | 22 " | | 40.00 | 38.96 | 49.75 |
| 36″ " 576′ | 131 " | | 40.00 | 35.20 | 49.75 |
| 42″ " , Cap, 3 Specials 6500′ | 1,924 " | | 40.00 | 35.31 | 49.75 |
| Concrete Masonry at outlet to force main | 84 cu. yds. | | 20.00 | 72.39 | 23.75 |
| Piling for outlet section | 61,000 lin. feet | | 0.75 | 0.89 | 0.99 |
| Lumber for caps and flooring for outlet section | 40,000 feet B. M. | | 60.00 | 101.25 | 87.00 |
| 42″ C. I. Pipe and Specials in outlet section | 6,500 lin. feet | | 20.00 | 15.00 | 12.50 |
| 24″ " , flexible joint and Specials, River crossing. | 1,308 " | | 30.00 | 50.00 | 38.71 |
| C. I. Pipe and Specials, Binondo Estero crossing | 103 " | | 40.00 | 26.22 | 10.13 |
| " " S. Jacinto " " | 102 " | | 40.00 | 26.22 | 8.78 |
| " " S. Miguel " " | 88 " | | 40.00 | 26.22 | 10.13 |
| " Tanduay Estero crossing | 84 " | | 40.00 | 26.22 | 9.46 |
| " Luneta " " | 144 " | | 40.00 | 26.22 | 9.46 |
| " and Special Trozo Estero crossing | 223 " | | 40.00 | 22.46 | 10.13 |
| " " " Meisic " " | 213 " | | 40.00 | 22.46 | 10.13 |
| " " " Bilibid " " | 156 " | | 40.00 | 22.46 | 9.46 |
| " " " de la Reyna " " | 212 " | | 40.00 | 22.46 | 10.13 |
| Earth excavation | 330,000 cu. yds. | | 1.59 | 1.76 | 1.69 |
| Concrete Masonry, except outlet section, arches of main sewers and flush tanks | 19,600 " | | 10.00 | 8.86 | 14.90 |
| Concrete Masonry in arches of main sewers | 3,860 " | | 11.00 | 9.83 | 15.75 |
| Brick Masonry, except in arches of main sewers and manholes | 3,040 " | | 15.00 | 21.60 | 19.78 |
| Brick Masonry in arches of main sewers | 3,970 " | | 20.00 | 17.50 | 19.78 |
| " " in manholes | 1,120 " | | 40.00 | 22.50 | 19.78 |
| Concrete invert blocks | 18,500 lin. feet | | 0.50 | 0.4550 | 0.74 |
| 24″ diam. terra-cotta pipe | 1,620 " | | 2.68 | 4.28 | 4.54 |
| 21″ " " " " | 8,860 " | | 3.17 | 3.60 | 2 90 |
| 18″ " " " " | 8,560 " | | 2.10 | 2.65 | 2.25 |
| 15″ " " " " | 8,800 " | | 1.63 | 1.99 | 1.56 |
| 12″ " " " " | 7,350 " | | 1 06 | 1.36 | 1.03 |
| 10″ " " " " | 18,040 " | | 0.86 | 1.06 | 0.84 |
| 8″ " " " " | 169,480 " | | 0.60 | 0.735 | 0.57 |
| Subdrain, 6″ diam. terra-cotta pipe | 19,400 " | | 0 44 | 0.455 | 0.36 |
| 6″ terra-cotta stand pipe | 9,900 " | | 0.44 | 0.47 | 0.46 |
| 6″ " " V-branches | 3.700 No. | | 1.44 | 1.71 | 1.69 |
| 6″ " " ¼ and ⅛ bends | 3,600 " | | 1.23 | 1.33 | 1.00 |
| Foundation lumber under main sewers | 570,000 feet B. M. | | 50.00 | 46.10 | 43.00 |
| " " " terra-cotta and C. I. pipe sewers | 300,000 " | | 30.00 | 30.00 | 30 00 |
| Sheeting and bracing lumber left in trench | 650,000 " | | 25.00 | 25.00 | 25.00 |
| Gravel in place around 6″ subdrain | 550 cu. yds. | | 1.50 | 2.35 | 2.00 |
| 2′ manhole frames and covers | 840 No. | | 15.00 | 9.35 | 12.50 |
| 3′ C. I " " " " | 10 " | | 25 00 | 19.00 | 25.00 |
| Flush tanks | 370 " | | 100.00 | 65.00 | 55.00 |
| 4″ terra cotta pipe | 1,200 lin. feet | | 0.32 | 0.30 | 0 25 |
| 4″ " " bends [¼] | 400 No. | | 0.95 | 0.75 | 0.50 |
| TOTAL | | | $1,631,053.20 | $1,650,789.82 | $1,701,591.10 |

# Modern and Complete Electric Lighting and Power Plant, Tientsin, North China

(Installed by Messrs. ARNHOLD, KARBERG CO., & Contractors.)

Messrs. Arnhold, Karberg & Co., the prominent general agents in China for German, British and American machinery of every description, and general managers of the New Engineering and Shipbuilding Works, Ltd., of Shanghai,



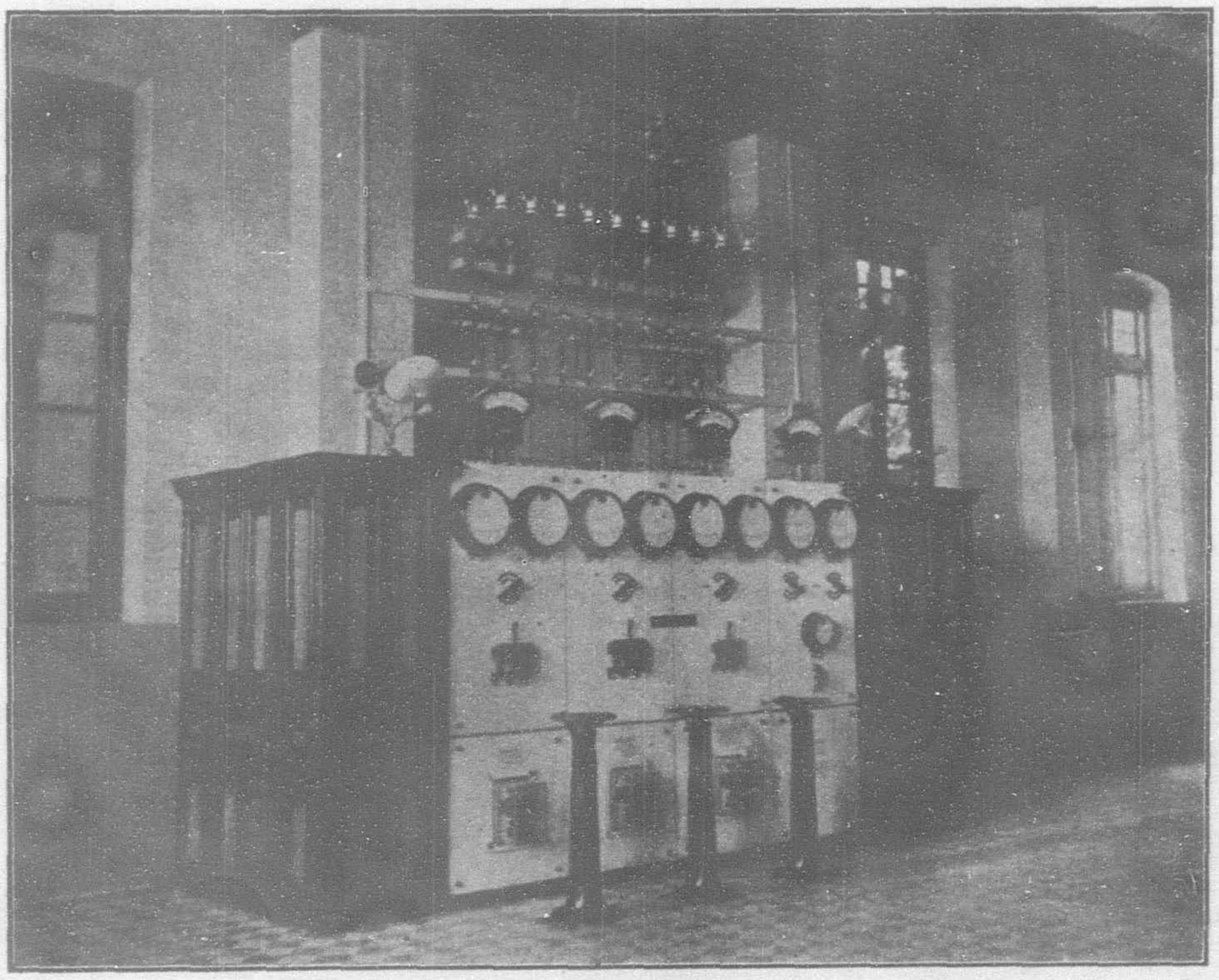
CENTRAL STATION, ELECTRIC LIGHT AND POWER SYSTEM, TIENTSIN

recently completed the installation, at Tientsin, North China, of a modern and complete electric lighting and power plant for the Tientsin Gas and Electric Light Company, Ltd. The managing director of this company is Mr. C. Poulsen. Mr. A. J. C. Waterland is its engineer-in-chief.

In connection with the plant provision and materials have been secured for the installation of electric fans and heaters, in addition to which arrangements and apparatus are provided in connection with experiments in wireless telegraphy under the System Telefunken, Berlin, for which Messrs. Arnhold, Karberg & Co. are general agents.

THE CENTRAL STATION.—The electricity works of the Tientsin Gas and Electric Light Company, Ltd., are situated at the end of Bruce-rd in proximity to the canal, in Tientsin, where a large plot of land has been acquired to serve for extensions and other purposes. The Buildings were constructed from designs by Messrs. Arnhold, Karberg & Co., under the supervision of Mr. Howard Ford, architect. They comprise an engine-room 60 ft. long by 30 ft. wide, a boiler-house 60 ft. long by 37 ft. wide, together with a suite of offices for the chief engineer and his assistants. They are of brick of ornamental design, and space has been provided for additional machinery. The chimney is of wrought iron, 4 ft. in diameter, and 85 ft. high.

STEAM DYNAMOS.—The generators consist of dynamos constructed by the Electrical Company, Ltd., and are directly coupled to high-speed engines of Messrs. Robey and Co.'s make. The small set is capable of developing 40 kws. at 550 r. p. m., and the two large sets 80 kws. each at 400 r. p. m. Each machine is capable of giving an emergency load of 25 per cent, in excess of the normal load for 2 hrs. without injury. Each engine is provided with steam pressure gauges and forced lubrication. The oiling of all the bearings and working parts is done by a pump driven off the engine shaft and supplied at a pressure of 15 lbs. per sq. in. A speed indicator, also driven off the shaft, indicates the revolutions. As the current is generated in the dynamo it passes through a set of collecting brushes, and thence through insulated cables to the main switchboard.



MAIN SWITCHBOARD AT THE CENTRAL STATION

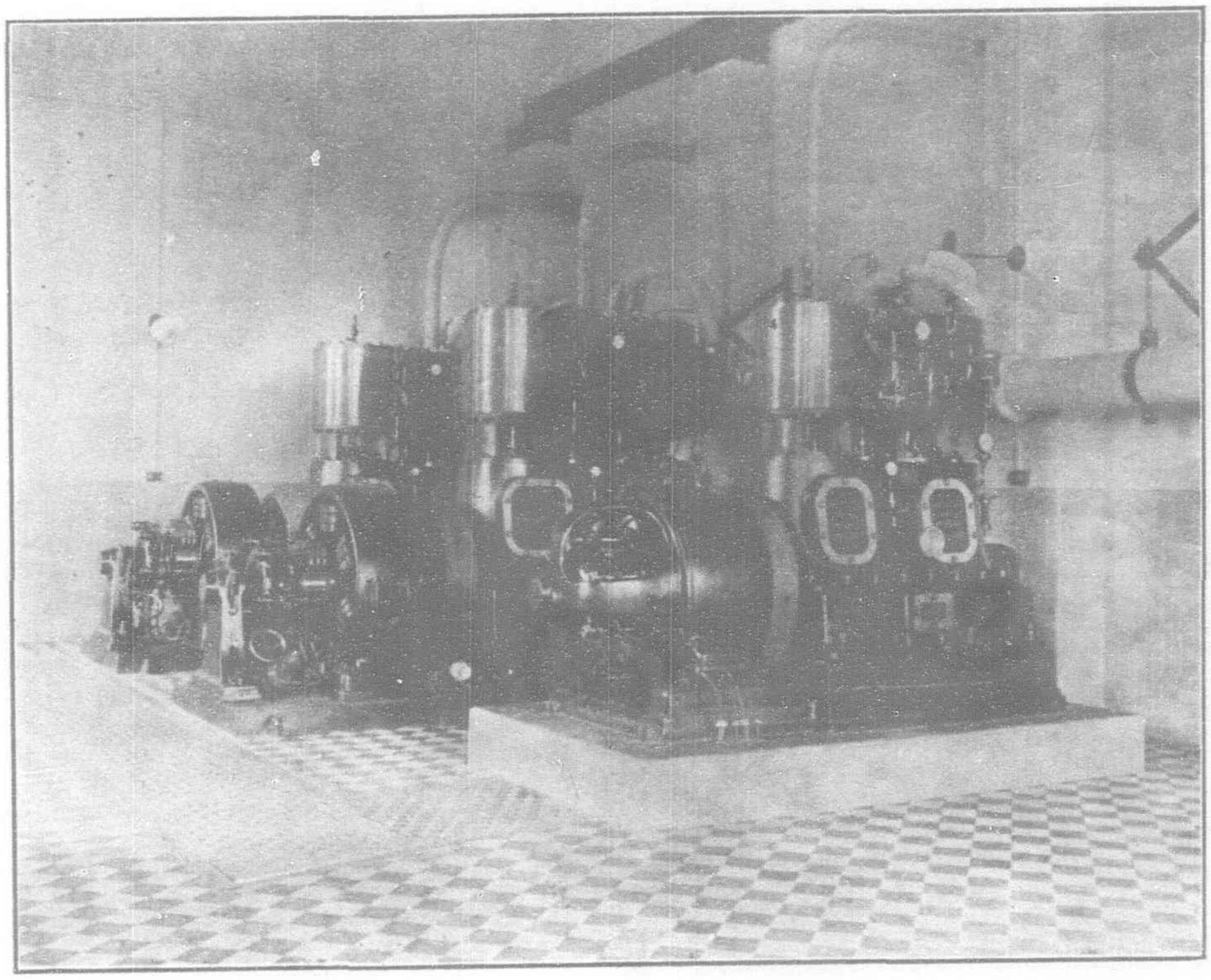
MAIN SWITCHBOARD.—This is built up of white marble mounted on iron supports and enclosed in a polished wood framing. The panels —one for each dynamo and one for the feeders— are provided with all the latest improvements in switches—regulating gear and instruments by which the output of the works is measured and recorded. The main conductors are at their back of the board and connect with the feeder cables through safety fuses. Each feeder is connected to a lightning arrester which is efficiently connected to earth through a large plate outside the building.

OVERHEAD CRANE.—The engine room is spanned by a travelling crane capable of lifting 5 tons.

PIPE WORK.—The steam pipes connecting the boilers with the engines are of lapwelded mild steel, and the condensing and exhaust steam pipes are of cast iron.

BOILERS.—The boilers, two in number, are of Messrs. Babcock & Wilcox's well known water-tube type, each capable of evaporating 4200 lbs. of steam per hr. at a pressure of 120 lbs. per sq. in. Each boiler is provided with a 10-in. pressure gauge, two water gauges, and the usual safety valves and accessories. Each boiler is also provided with a soot-cleaning apparatus, the tubes being cleaned of all soot and other deposits by means of a jet of steam applied through a hose. These boilers have a large heating surface, *viz.*, 1619 sq. ft., consuming very little water compared with other types; consequently steam can be raised very rapidly without injury, the average time taken to raise steam being about 30 mins.

ECONOMIZER.—In the main flue leading to the chimney an economizer is provided for raising the temperature of the feed-water by means of the waste gases. The water thus reaches the boiler at a temperature of from 150° to 250°, and effects a saving on the coa bill of from 15 to 20 per cent. The economizer consists of a number of castiron pipes through which the water flows, and in order to keep the pipes clean and free from soot on the external surface, slow moving scrapers are fixed, and



"ELECTRICAL" DYNAMOS, DIRECTLY COUPLED TO HIGH-SPEED ROBEY & CO. ENGINES

these are kept moving up and down by a small steam engine.

FEED PUMPS.—There are two duplex feed pumps of Tangye's make, each capable of pumping 500 galls. of water per hr. against a steam pressure of 160 lbs. per sq. in. These pumps draw their water from a large tank overhead holding 1000 galls. of water. Attached to the pumps is a filter, through which the water passes on its way to the boiler; this removes any oil or other foreign matter detrimental to the life of the boiler.

SURFACE CONDENSER.—This has a surface of 700 sq. ft., and is capable of condensing 7000 lbs. of steam per hr. It is manufactured by the Worthington Pumping Engine Company. It is self-contained, and consists of air and circulating pumps on one bed plate. The cooling water is obtained from a well outside connected with the canal, and the eondcnsed water is delivered by the air pump into the feed-water tank, and is used for feeding the boilers. Before the exhaust steam enters the condenser it passes through a separator which removes nearly all the oil from the steam, and this oil is removed by a small engine, and can be used for various purposes.

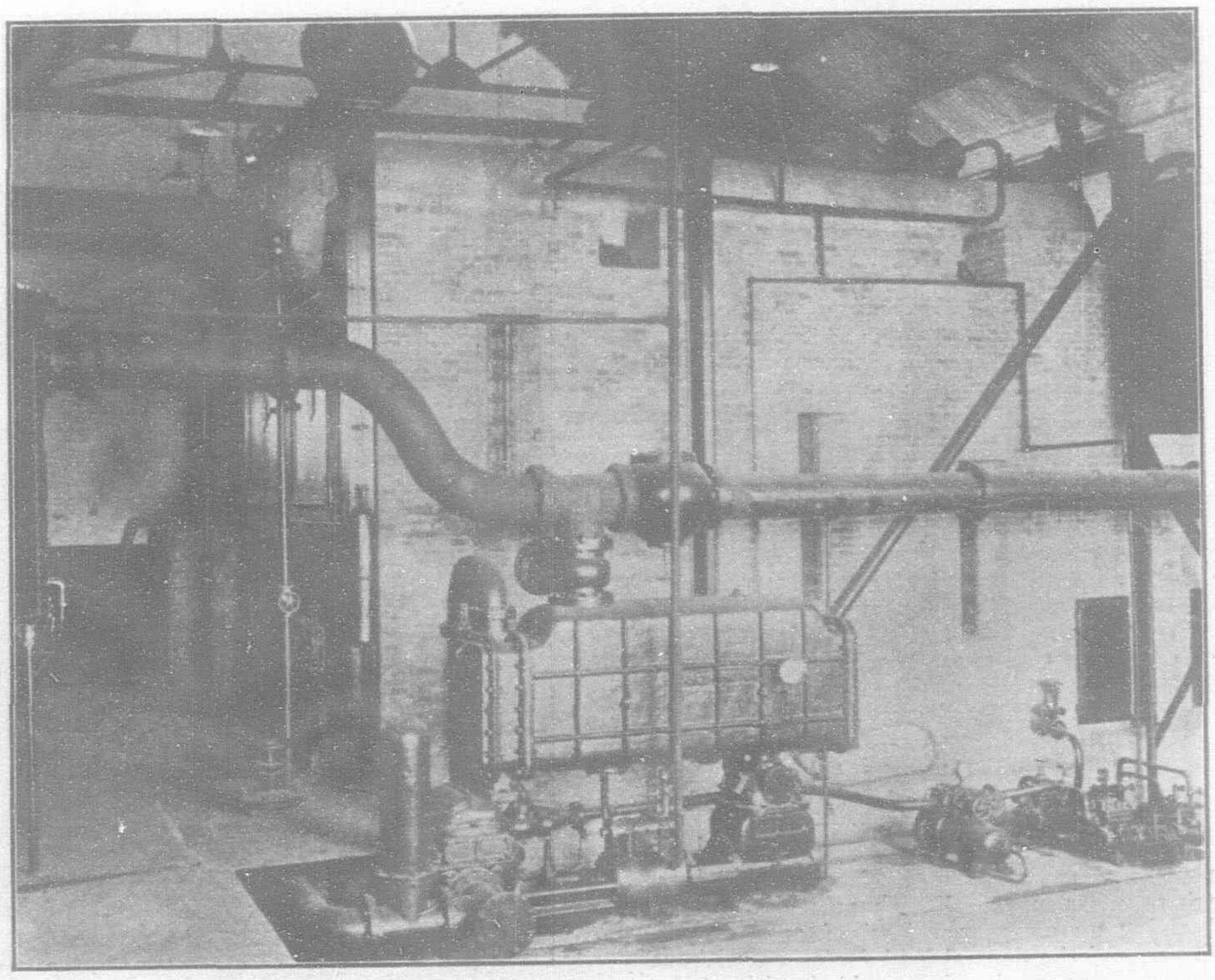
MAINS.—These consist of three distinct types of conductors:—

(1) *Feeders.*—Which run from the power house to different points in the town, where they connect the ordinary distributing mains. These feeder cables are not tapped along their entire lengths and current is supplied to them at such a pressure at the works that by the time it reaches the feeding point it feeds into the distributing main at the normal pressure required by the consumers. Pilot lines are laid back from such feeding point to the Power House to indicate to the attendant the pressure at the various points. (2). *Distributing Mains.*—As their name implies, these convey current along the various streets in which the demand is made by private consumers. The mains are laid in the following streets, and will be extended as the demand warrants it:— Victoria-rd, Taku-rd, Race Course-rd, Davenport-rd, Garden-rd, Elgin-ave, Recreation-rd, Fei Lung-rd, Hsin Yuen-rd, Bristowe-rd, Consular-rd, Canton-rd, Ewo-rd, Kwang Lung-rd, Pao Shun-rd, The Bund, Club-rd, Parkes-rd, Meadows-rd, Council-rd, Cousins-rd, and Dickinson-rd. (3.) *Service Lines*—These are the short lengths connecting the distributing mains with the consumers' premises.

PUBLIC LIGHTING.—The stre et lighting, when complete, will consist of about 250 32 candle-power lamps. These lamps are connected to their own system of mains and controlled in groups from various parts of the town. This arrangement effects great saving in labor and the whole settlement can be lighted in a very short time.

PROGRESS.—The demand which has already been made augurs well for the future of the undertaking. The company is still very busy in its installation department.

CONTRACTORS.—Messrs. Arnhold, Karberg & Co. are the contractors for the complete system, including buildings, plant, mains, etc. They have given to the enterprising city of Tientsin an electricity plant that will meet the demands of the community for years to come.



BATTERY OF BABCOCK & WILCOX BOILERS, AND ACCESSORY BOILER ROOM MACHINERY

## FEDERATED MALAY STATES

The reports on the Federated Malay States for 1904 have just been issued by the British Government as a "blue book." They comprise the annual report by the resident-general on the states as a whole, and of reports by the residents on the various states particularly, with a covering dispatch by Sir John Anderson, the high commissioner, dated Singapore, September 6th, 1905. Sir John Anderson, in the course of this dispatch, says in part:—

These reports contain the same record of continuous progress and prosperity that has been repeated with unfailing regularity in previous reports. Since I forwarded the reports for 1903 I have travelled through all the states, and though I had diligently studied all previous reports, I confess that I had formed but a faint conception of the actual extent of the progress which has been achieved during the brief period that has elapsed since British officers first came to the assistance of the native rulers in the administration of their states. Not only have law and order been firmly established throughout the whole area, but so far at any rate as the three western states are concerned, they are better provided with roads and railways, public buildings, and all the usual adjuncts of administration and comforts and amenities of civilization than any of the crown colonies in the empire. The construction and maintenance of roads and railways through a tropical country is always expensive and difficult, and the fact that on an average over 22 ms. a year have been added to railways, and more than double that length to roads entirely from revenue, shows the extraordinary natural wealth of the states.

In Pahang much less progress has been made. It has only had a president since 1888, and the disturbances which characterized its earlier history no doubt retarded its progress to some extent. But the main factor in its slow development has undoubtedly been the difficulty of communications. . . . The main problems in the western states are no longer those of opening up the country, but those attending the growth of towns—water supply, sanitation, lighting, etc., and these are now, with the aid of the local sanitary boards, receiving attention. During my tour through the states I received a deputation of planters at Kuala Lumpor and discussed with them in a friendly and informal way the supply of labor. There appeared to me to be some justification for the complaint, and I arranged that 6,000 of the 8,000 tickets which, under the coolie immigration contract with the British India Company the government has bound itself to take, should be given free to the planter's associations for distribution among their members on the understanding that government would be free to recruit in the states any labor required beyond the number especially imported on its behalf. The arrangement has now been in force for nearly a year, and the planters are quite satisfied, while the government finds no difficulty in maintaining its labor force.

# Commercial Value of the Cocoanut is Enhanced by Scientific Culture of the Palm

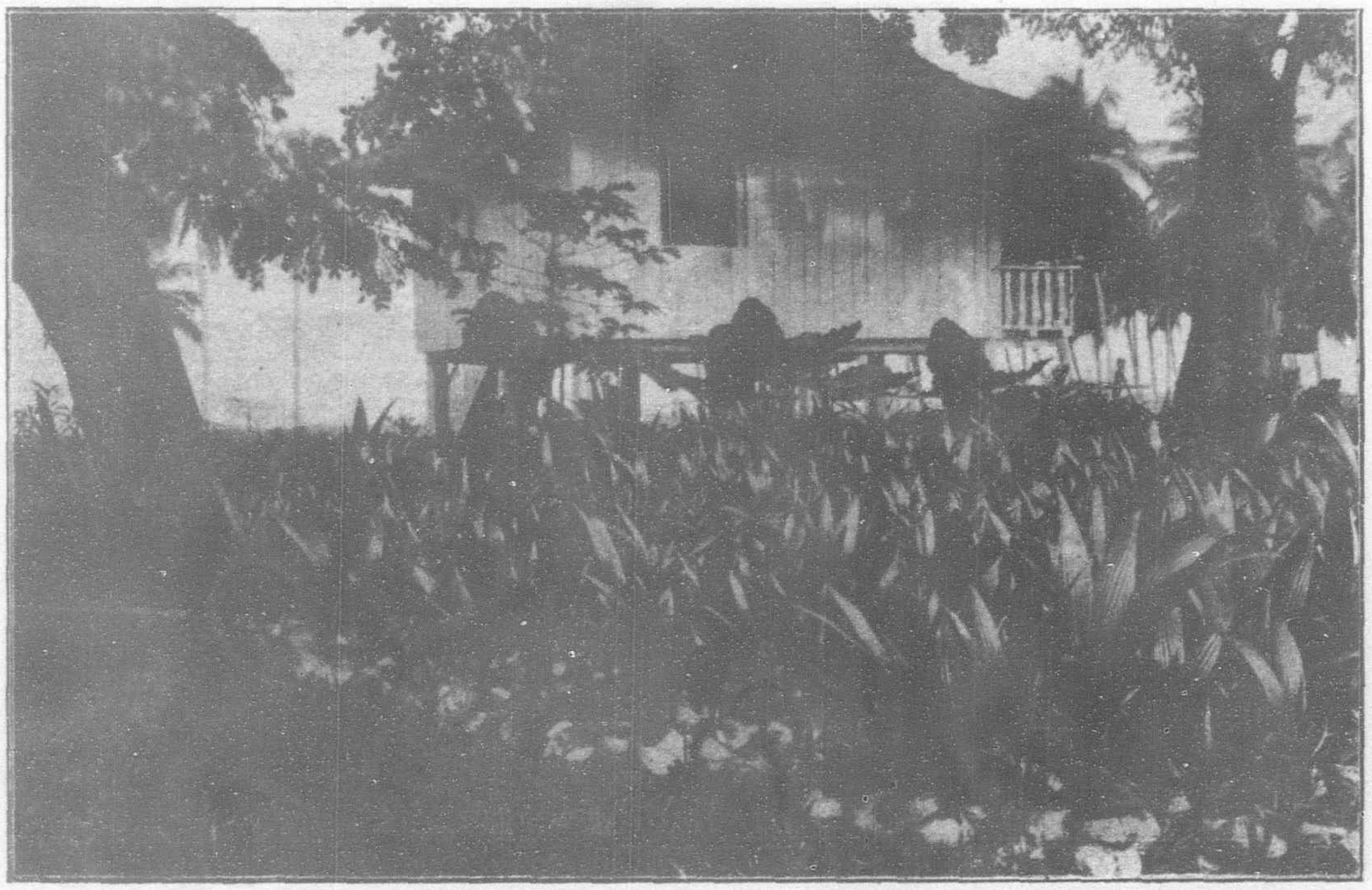
COCOANUT PALMS GROWING ON THE BEACH AT SAN RAMON, SHOWING HABITAT

Mr. Edward Bingham Copeland, a biological expert of the Bureau of Science of the Philippine Islands, having shown in a most interesting and instructive paper published in the initial number of *The Philippine Journal of Science* that judicious fresh-water irrigation is very essential to the thrift and fruit-bearing quality of the cocoanut palm, Mr. Herbert S. Walker, a chemical expert of the same bureau, follows with a paper on *The Cocoanut and Its Relation to the Production of Cocoanut Oil.* From a commercial and industrial standpoint Mr. Walker's paper is a treatise of immense value, although, while Mr. Copeland's contribution discussed the scientific development of the palm under methods of culture, old and new, and the effects of fertilization, transpiration and drought upon the yield, it might be well to set down here the conclusions the latter has arrived at after a thorough investigation of his subject, before taking up the next paper. Mr. Copeland says:—

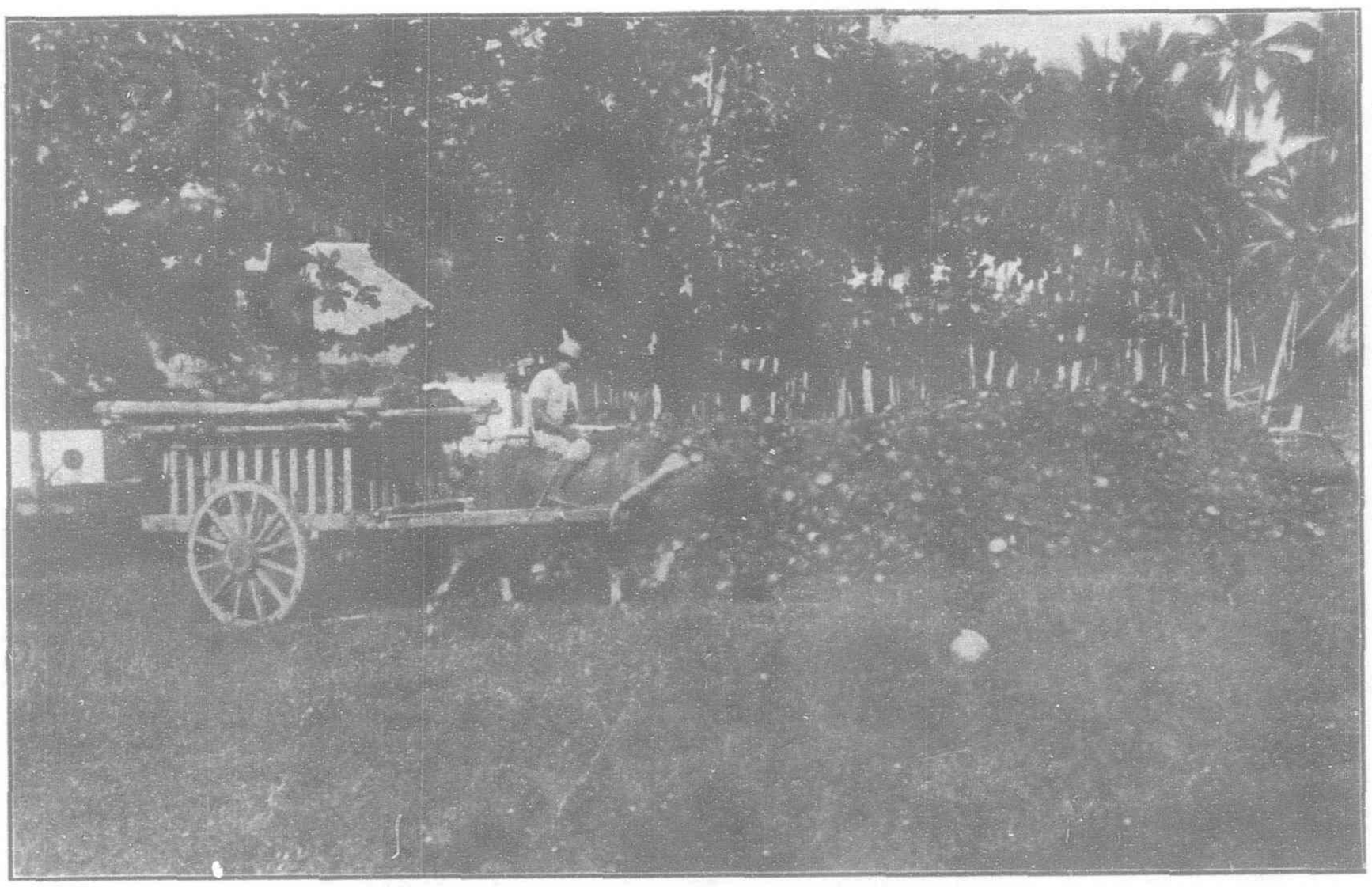
"We have just seen that a considerable supply of water must constantly be at the disposal of the cocoanut, or it will protect itself against injurious desiccation by a partial suspense of its vitality. The necessity of this water as the carrier, in solution, of the plant's mineral and nitrogenous raw food has previously been touched upon. I made no direct experiments in the fertilization of the cocoanut, but it is the unanimous experience of those who are acquainted with the subject that an increase in some of the constituents of its mineral food has a very marked favorable effect on the production of the fruit. At San Ramon certain trees are pointed out as particularly productive because they have long received the waste from the kitchen. The quantity of mineral food which the tree takes is roughly proportional to the amount of water which it absorbs. Increasing the plant's transpiration has, then, the same effect as supplying a fertilizer to the ground. The amount of transpiration can be increased in two ways—by increasing the amount of water at the disposal of the roots and by improving the conditions for its evaporation from the leaves.

"In season of drought the first method does the plant a double service, for the water which is artificially furnished is not only valuable in itself but also because of the substance dissolved in it. However, during other seasons, irrigation may not merely be useless but even very injurious, for ground too wet does not favor the activity of cocoanut roots any more than that which is too dry.

"We have seen that the transpiration of the cocoanut is somewhat accelerated by the wind and greatly so bnty iense illumination. There-



THE NUTS SET OUT IN THE SEEDING BEDS

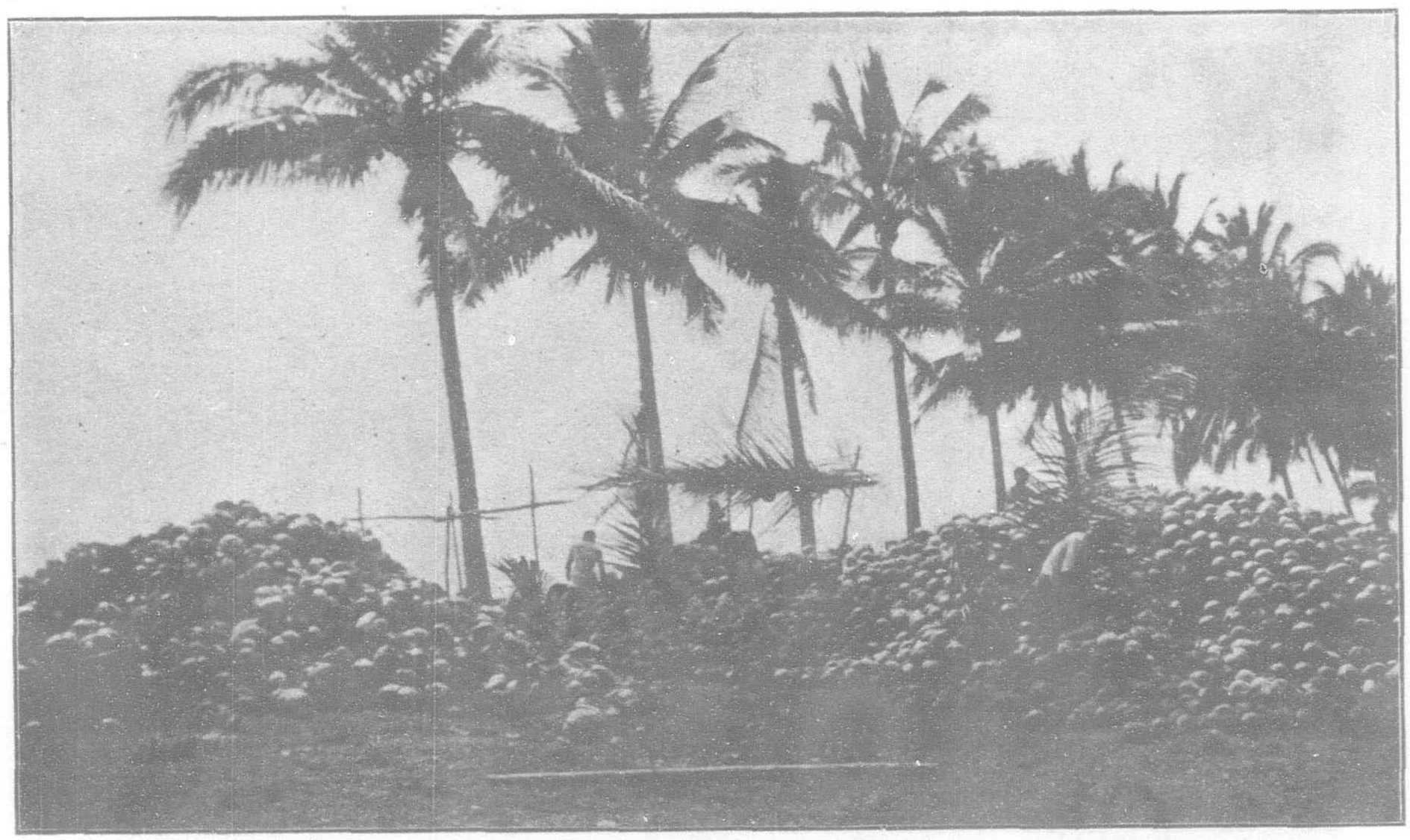


GATHERING COCOANUTS IN PILES NEAR THE DRYING SHEDS

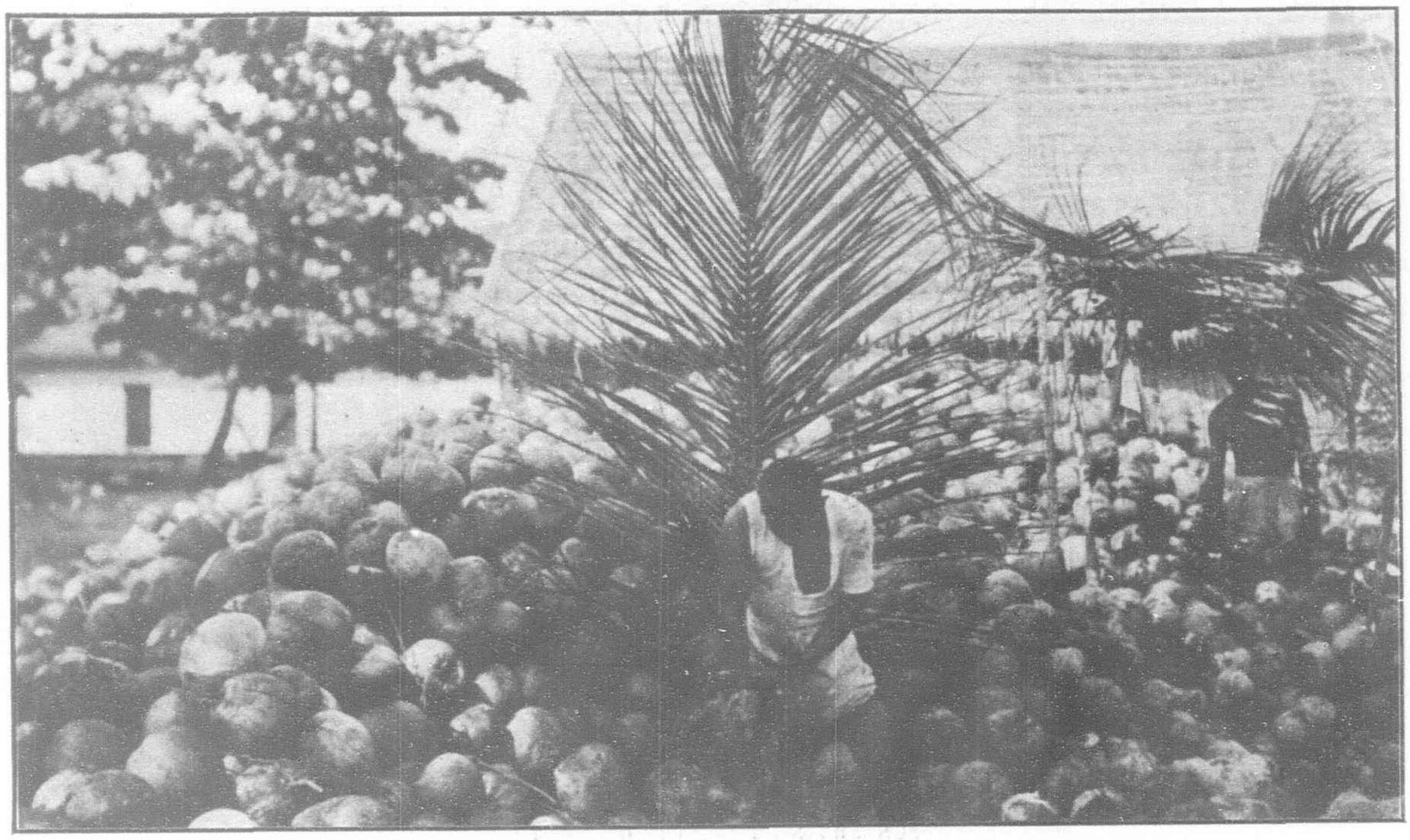
fore, so long as the roots are not in too dry a soil, it is in the plant's interest to be exposed as much as is normally possible to these two agents. On any considerable tract devoted to cocoanut culture this can be done in but one way—by not planting the trees too close together. I have never seen a grove in which the trees were sufficiently far apart so that, unless other conditions were very unfavorable, the trees around the outside were not much more productive than those in the interior. At San Ramon, a considerable proportion of the trees are planted in double rows, one row along each side of a narrow road. In such a row, which contained no nonbearing trees, I found the yield at one cutting to average 22 nuts to the tree. A row of trees along the well-drained bank of a slough yielded an average of 27 nuts, all trees producing. A single tree standing by itself in the open yielded 55 nuts. In the interior of an old grove, the average for the producing trees was about 11, and in the same situation in a large one on the neighboring hacienda of Talisayan the average for bearing trees was only 8; the individuals in the area where this count was made were as a rule about 18 feet apart, their crowns interlaced freely, producing a rather dense shade, and many trees were without ripe nuts.

"I have no doubt that up to a distance of at least 15 meters any increase in the intervals between trees will result in an appreciable advance in the average yield per tree, but by planting beyond the intervals at which the interlacing of roots and of leaves would bring the trees into keen competition for water and light, and would also largely break the wind passing through the crowns, the increase in the yield of nuts for the individual trees would not be commensurate with the area of land in use. In my opinion, the trees in a grove can usually best be placed at intervals of about 9 meters In exposed rows they may well be closer together, and where intense cultivation is economically possible the distance between them may be a little less.

"The natural habitat of the cocoanut is the strand. It is restricted to this because it bears fruit too large to be practically transportable by any other natural agent than the water; and it is adapted thereto by possessing superficial roots which are uninjured by temporary exposure to concentrated solutions, by having a tough, very elastic trunk, and by producing leaves which are not merely tolerant of the most intense insolation and wind but which are unable to work to the best purpose without more light and wind than many plants can endure. As is true for every cultivated plant, it is possible to create for the cocoanut conditions altogether more favorable for its utmost thrift than are ever known to occur in nature. It naturally grows in a "poor" soil—that is, in one in which its mineral and nitrogenous raw food is present in very dilute solution. We can improve its environment in this respect, and can profitably carry this improvement much further than is the general practice at present. But the cocoanut must not be expected to thrive, even in the richest soil and with the best cul-



SORTING AND HUSKING NUTS ON THE BEACH NEAR THE DRYING SHEDS

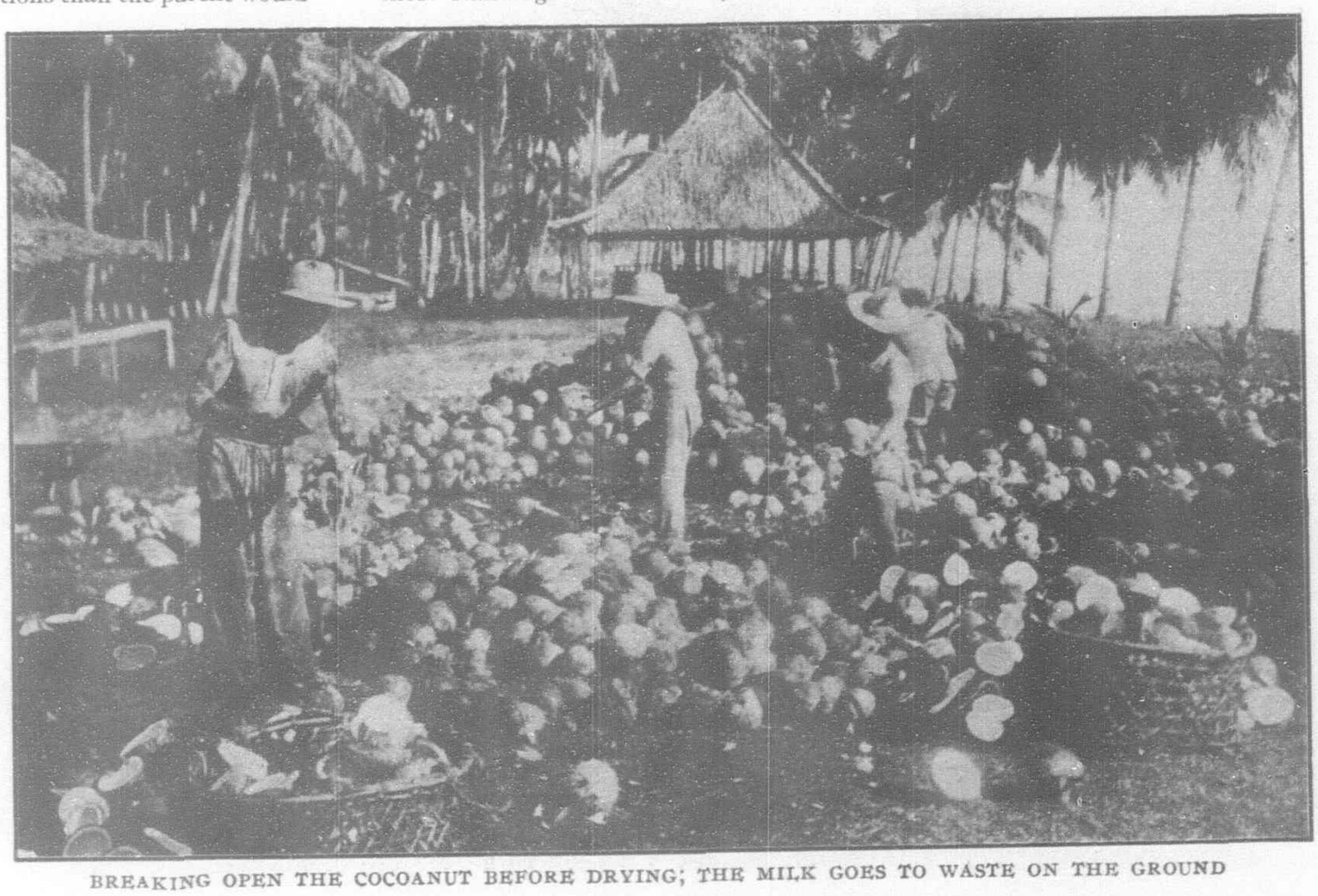


METHOD OF HUSKING THE COCOANUT

tivation, if its supply of light is restricted by other trees or in any other way, or where the air is too still or an adequate supply of water is not always available near the surface of the ground.

"There is another method of increasing the yield of cocoanuts, slower but more permanent than improved cultivation; this is by the selection of seed. I have done nothing with this subject, and only mention it because the results of selection can not appear for many years, and a mistaken method would be long in showing its uselessness. Nuts obviously should be selected for seed from trees conspicuous for the amount or quality of their yield. It is usually not a difficult matter to decide whether or not the tree's superior yield is due to its growing under exceptionally favorable conditions. If it is, it shows how other trees may be made to bear equally well, but there is no reason for selecting the nuts of such a tree for seed; its offspring can not be expected to bear more nuts under ordinary conditions than the parent would have done without its exceptional advantages. The environment is not hereditary. The tree the nuts of which should be used as seed is the one the production of which is great in proportion to its opportunity. A tree bearing regularly 12 nuts to the cutting under conditions which allow its neighbors but 8 should have its nuts saved for seed in preference to those of an individual having 30 nuts among equally productive neighbors."

THE COCOANUT AND ITS RELATION TO THE PRODUCTION OF COCOANUT OIL.—In his investigation of cocoanut production from the standpoint of the quality and quantity of the oil yield, Mr. Walker found that the first problem which presented itself was the influence of the soil in which the trees grow on the yield of nuts, copra, and oil. It had been noticed for a long time that the cocoanut trees growing near the seashore at San Ramon (Government Farm, W. coast of Mindanao, 10 ms. N. of Zamboanga), produced much more fruit than those standing further inland, and it had also been stated that the former trees bear a better quality of nuts than the latter. To determine how far these facts might be accounted for by the greater fertility of the soil near the sea, Mr. Walker made analyses of a number of soils in which cocoanut trees were growing, the samples being taken at the beach as well as further inland, and two at Davao, Mindanao, one sample at the mouth of the Davao River about 50 ft. from the sea, and another at a distance of 50 ft. from the same river about 1 m. inland from the sea, where trees were growing well. Chemically, the result of these analyses showed very little difference between the soils near the sea and those further inland. The latter, contrary to what was supposed, were found to be somewhat superior to the former. From these results it is evident to Mr. Walker that the inferior quality of the inland trees can not be explained by the analytical difference in the soils; neither does the salt from the sea appear to an appreciable extent, even around those trees which are actually growing on the beach.



BREAKING OPEN THE COCOANUT BEFORE DRYING; THE MILK GOES TO WASTE ON THE GROUND

SUN DRYING THE NUTS ON TRAYS

SEEPAGE WATER FURNISHES NUTRITION TO BEACH TREES.—It therefore seems very probable to Mr. Walker that in Son Ramon at least, if not in most plantations along the seacoast, the nutritive material comes not from the soil in which the trees are actually growing but from an inexhaustible supply of water, laden with plant food, which is constantly seeping down from the higher ground towards the ocean. This underground water supply would, in the opinion of Mr. Walker, account for the flourishing condition of trees in sandy soil near the sea, even in times of drought, when individuals farther inland in higher, less permeable ground would be dying for want of water. In the case of the less permeable soils, artificial irrigation during the dry season seems to Mr. Walker to be of the utmost importance, and any addition to the fertility of the soil, either in the form of manure or of a chemical fertilizer, would probably be repaid by an increased yield of fruit. For soil near the sea, under conditions such as exist at San Ramon, irrigation is of course unnecessary except in times of extreme drought, and fertilization would be of doubtful advantage.

THE NUT AND ITS OIL PRODUCTION.—In, studying this phase of the cocoanut subject, Mr. Walker found that one of the first and most important problems which presented itself was to determine the effect of the age and the relative maturity of the nut on the percentage of its various constituents; in other words, to find out the most favorable time for opening a nut to obtain the largest and best yield of copra and of oil. With this end in view analyses were made of several series of ten nuts each with the following results, all weights indicated being in grams, and meat, copra and oil calculated to per cent in nut free from husk:

SERIES I.—Ten nuts, fresh from tree but fairly ripe (all green husks): Average total weight, 2,848; per cent of meat 40.5; of copra 18.9, of oil 12.4.

SERIES II.—Ten nuts, very ripe (dead brown husks), selected from pile of several thousand: Average total weight 2,110, per cent of meat 41.7, of copra 21.7, of oil 13.4.

SERIES III.—Nuts stored 3 mos., just beginning to sprout: Average total weight 2,805, per cent of meat 45.8, of copra 23.5, of oil 14.5.

SERIES IV.—Nuts stored 6 mos. which had not sprouted (most nuts of this age have sprouts 20 to 30 centimeters long): Average total weight 2,866, per cent of meat 46.0, of copra 19.5, of oil 12.4.

SERIES V.—Ten nuts not fully ripe, fresh from tree: Average total weight 3,958, per cent of meat 34.4, of copra 11.5, of oil 7.5.

SERIES VI—Nine nuts from same tree as Series V, but fairly ripe: Average total weight 2,384, per cent of meat 41.7, of copra 21.0, of oil 13.6.

SERIES VII.—Nuts from same tree as Series V, but dead ripe: Average total weight 1,558, per cent of meat 43.8, of copra 23.4, of oil 15.5.

These last three analyses very conclusively show the change which is taking place as the fruit becomes riper. The average percentages of copra and oil, for example, in the nut free from husk in the green fruit, are only 11.5 and 7.5, respectively, but they rise to 21 and 13.9 in the "fairly ripe" nuts, and assume a maximum

SUN DRYING, SHOWING THE NUTS ON THE TRAYS, READY TO BE PUSHED UNDER THE SHELTER

KILN USED FOR DRYING NUTS

of 23.4 and 15.5 in the case of the series which had been allowed completely to ripen while still on the tree This gain is practically due to an increase in the percentage of meat, which runs 34.4, 41.7, and 43.6 in series V, VI, and VII, respectively, at the expense of milk, but it is also accounted for by the increase of solid matter and loss of water in the former.

SERIES VIII.—Ten thoroughly ripe nuts from one tree (the nuts on this tree all have a green husk until they become "dead ripe," when they change to a dull brown): Average total weight 1,704, per cent of meat 42.8, of copra 20.4, of oil 13.3

SERIES IX.—Ten thoroughly ripe nuts from one tree (these nuts have a golden-yellow color until "dead ripe," when they look like those of Series VIII: Average total weight 1,702, per cent of meat 42.5, of copra 21.6, of oil 13.8.

Very little difference can be observed between these two varieties; the average weight is almost exactly the same. The percentage of husk and shell is somewhat lower in the yellow nuts, but this average to a large extent is counterbalanced by their percentage in milk, so that the amount of meat in the two remains practically the same.

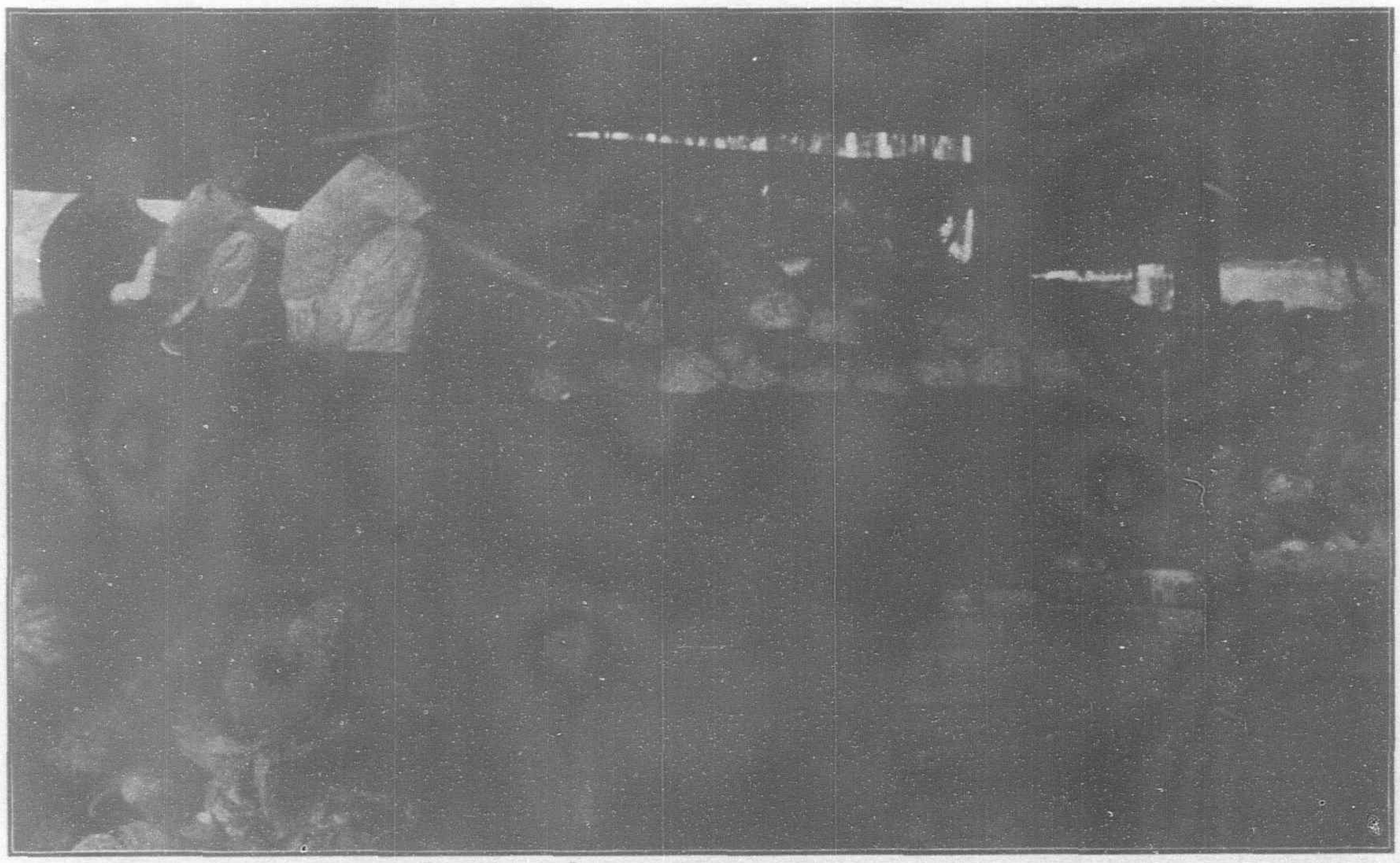
SERIES X.—Ten nuts from a pile of 1,000 taken from trees near the sea: Average total weight 2,811, per cent of meat 42.1, of copra 22.0, of oil 14.7.

SERIES XI.—Ten nuts from a pile of 1,000 taken from trees inland about 1,800 ft.: Average total weight 2,894, per cent of meat 39.8, of copra 19.7, of oil 12.0.

In selecting nuts for the two preceding series of analyses no attempt was made to secure uniformity as to size and age. On the contrary they were picked out with a view of obtaining fairly representative samples of the largest and of the smallest, as well as of the most and of the least mature in each pile, so that they would vary through a wide range of color and weight. On comparing the two lots it will be found that the results agree very closely. Series XI, averages a little higher in the total yield of copra. but the oil content of this copra is somewhat lower than in series , Xso that they yield exactly the same quantity of oil per nut. The proportion of husk taken from the sea nut is much larger than it is from those gathered from the interior, but this is compensated for by the fact that the percentage of milk in the nut, free from husk, and of water in the fresh meat is considerably lower in the former than in the latter. Therefore it appears to be very evident that the superiority of trees growing near the sea is solely due to the quantity and not the quality of the nuts they produce.

ANALYSES OF A LARGE NUMBER OF NUTS.—As a check on these last results, secured on a small scale, Mr. Walker decided to determine the actual weight of the various products of the cocoanut under conditions ordinarily obtaining in the manufacture of the commercial copra, and with this end in view, 1,000 nuts were procured from trees growing near the seashore and the same number from those standing in the

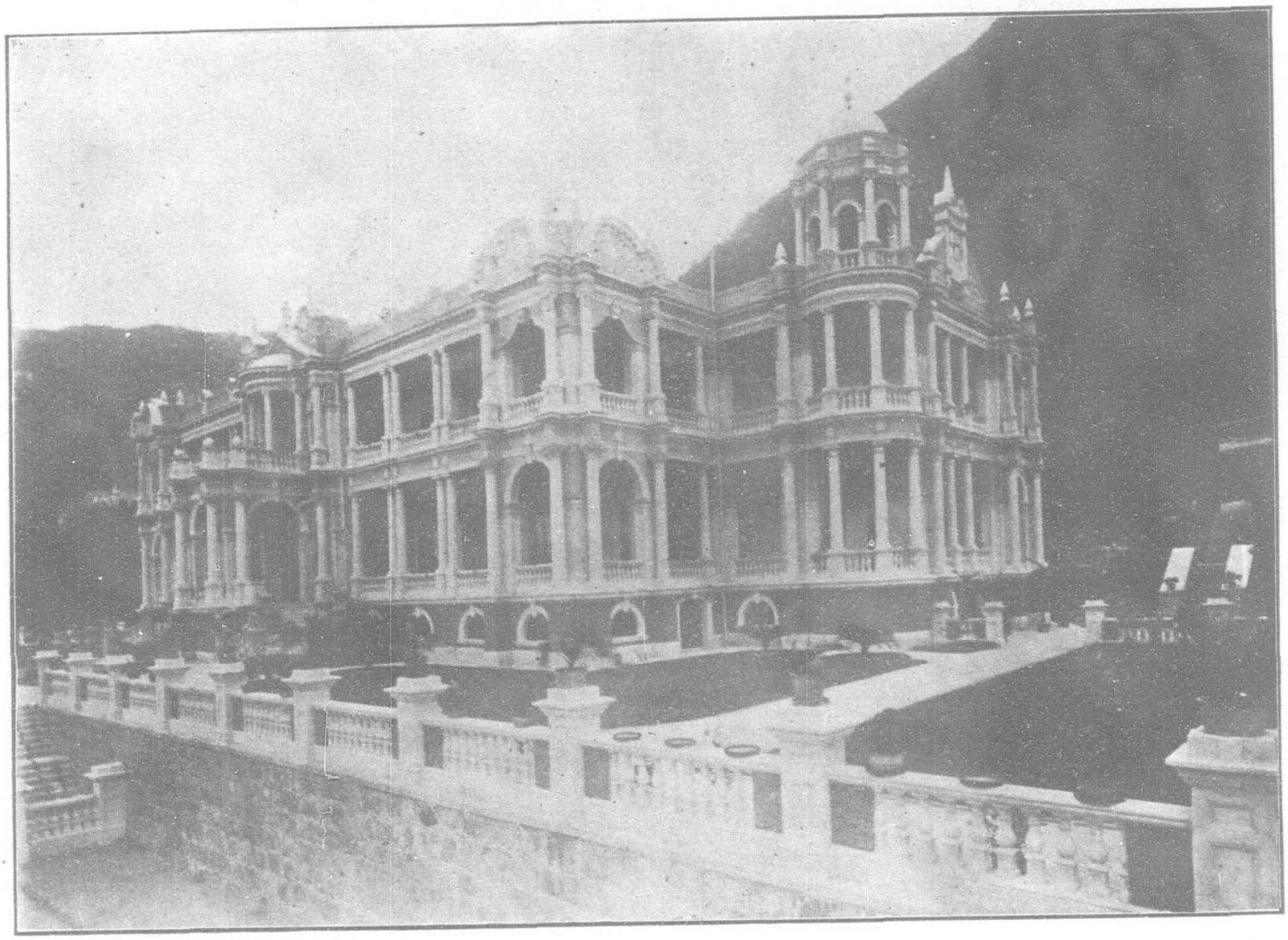
*(Continued on page 228.)*



KILN DRYING; THE HALVES OF THE COCOANUTS ARE PLACED OVER THE GRILL FOR THE PRELIMINARY DRYING

# PALATIAL RESIDENCE OF SIR PAUL C. CHATER IN THE HILL DISTRICT, HONGKONG

(Messrs. LEIGH & ORANGE, Architects and Builders.)

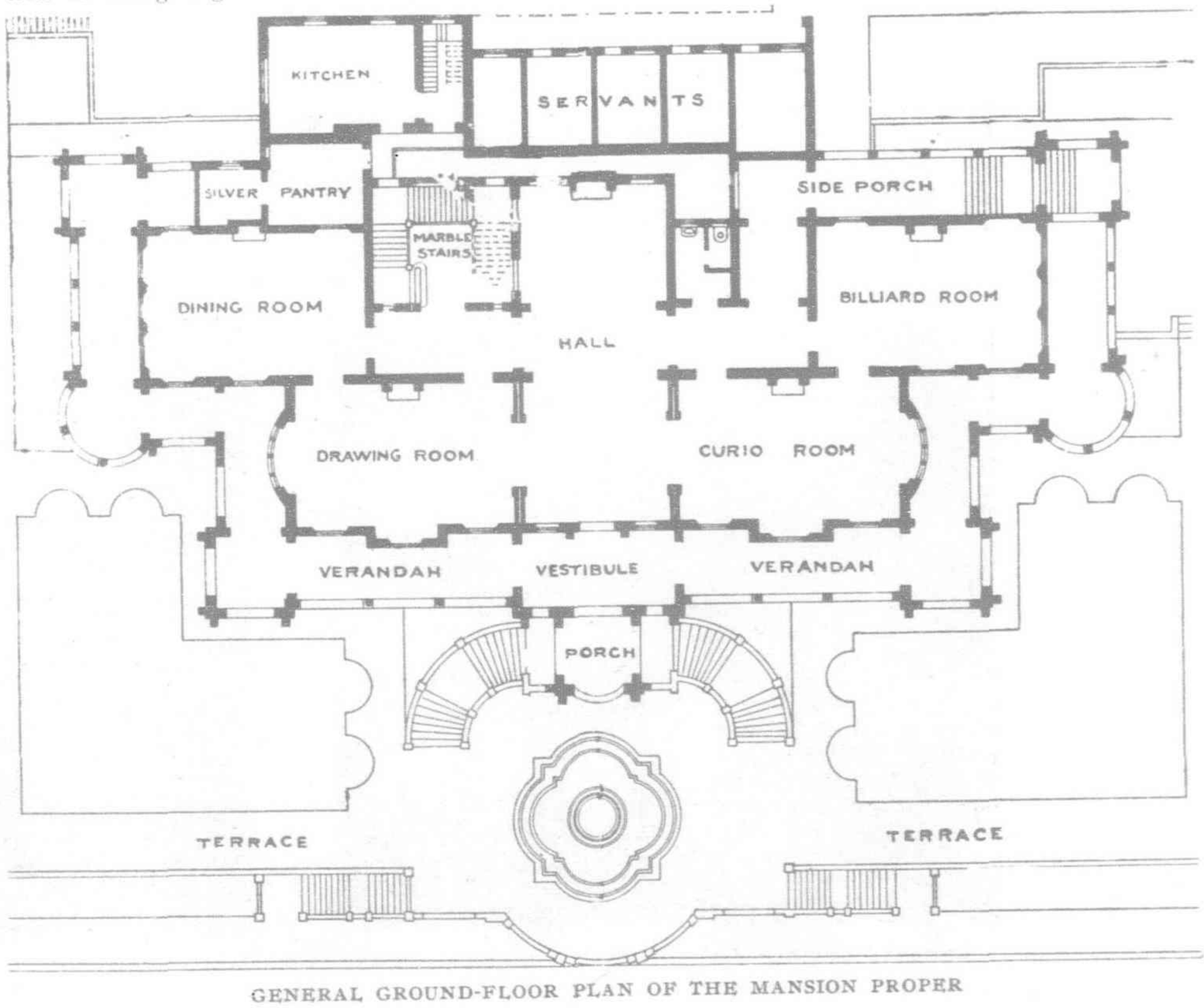


ELEVATION OF THE COMPLETED MANSION

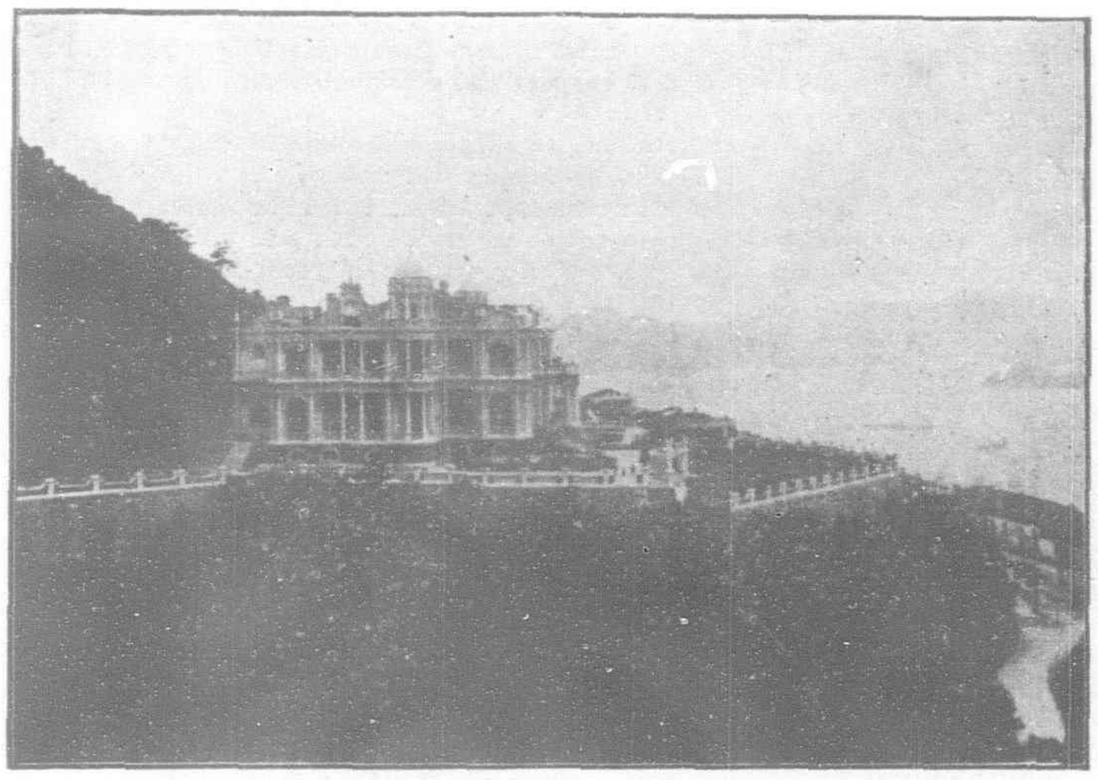
The recently-completed mansion of Sir Paul Chater, the *doyen* of Hongkong's merchant princes, is a triumph of architectural grandeur and elegance. The palace stands on a beautiful site of the Hill District of the colony, off Conduit-rd, and, according to the *Hongkong Telegraph*, from the center of the city to the battlement walls that encircle the structure a steep and ever steeper mountain path has to be negotiated, but at every turn new natural beauties unfold themselves while here and there the busy harbor, looking its best, peeps through the tangle of trees and rocky buttresses. A mountain rivulet carols down a gorge, below the pathway, and in bright days the ascent is bracing and wonderfully beautiful. In the depths lies Hongkong, while the mansion itself stands out clear-cut and cameo-like on the crest, backed by a rugged hill which rises still higher.

THE INITIAL DIFFICULTIES.—A considerable time has passed since Sir Paul Chater first decided to erect a mansion on the heights, but innumerable natural difficulties had to be overcome before even the first germs of his idea could be clothed in solid form. The site was obtained, but it was far from being then the plateau into which it has now been converted. It was a rocky eminence, abounding in physical excrescences, difficult of access. Near by was a sort of reservoir or tank which must first be removed, and altogether it was no easy engineering work which confronted the architects. But stimulated by the author of the scheme, Messrs. Leigh & Orange, who were appointed the architects, succeeded in surmounting the numerous obstacles before them, and the result of their work, or rather achievement, is seen to-day in what will rank for many years, if not for ages, as the finest mansion owned by a private citizen in Hongkong. Others may be led to emulate Sir Paul Chater in this matter, but theirs will be an uncommonly arduous task, which may not even at the finish realize their ambitions.

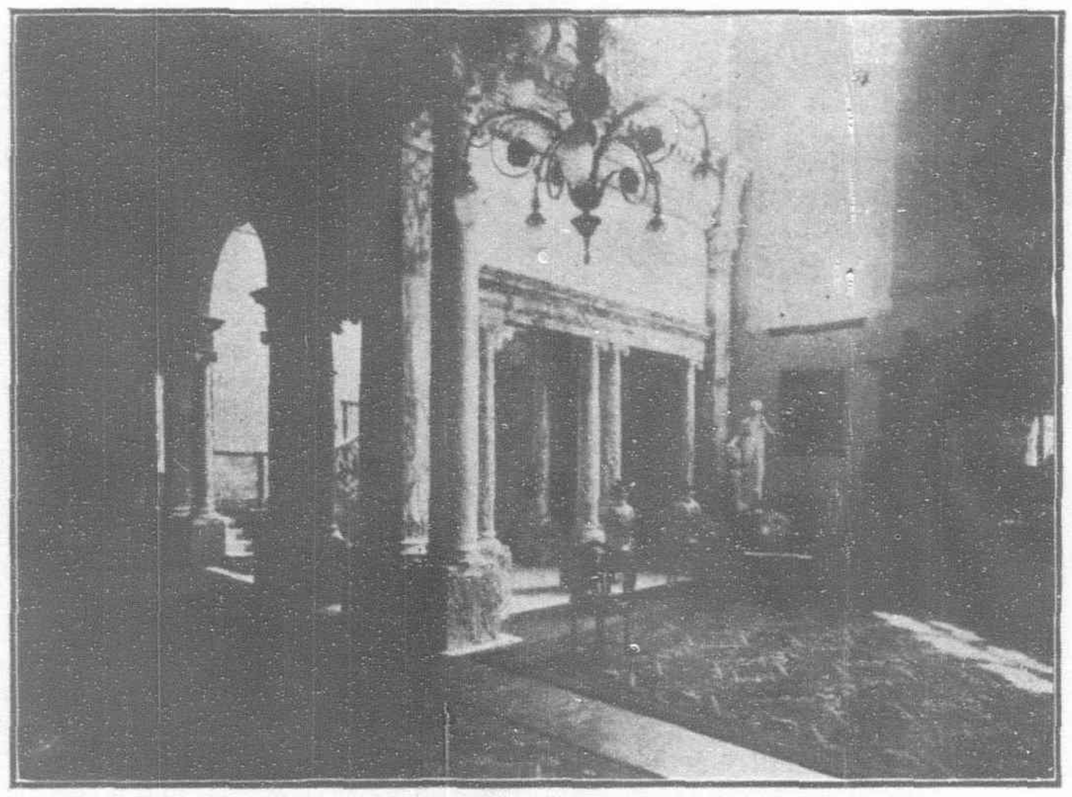
APPROACHING THE MANSION.—The mansion stands directly above the central business portion of Hongkong. In other words, it looks down upon the clock tower, whose dial can just be discerned through the trees, looking from the terrace of the residence. The building




GENERAL GROUND-FLOOR PLAN OF THE MANSION PROPER



ANOTHER VIEW OF THE RESIDENCE



MARBLE STAIRS, GROUND FLOOR; TAKEN FROM THE HALL

itself has been designed on classic lines, with a suggestion of the Renaissance in the stately colonnade which supports the verandahs. Approaching from the city, admission to the grounds is obtained through an ornamental gateway, heavy wrought-iron gates hung on moulded granite piers. The iron scroll-work of the gates was specially designed by the architects and finished in England. A charming lodge will be found at the entrance—and thence by a winding path to the main entrance.

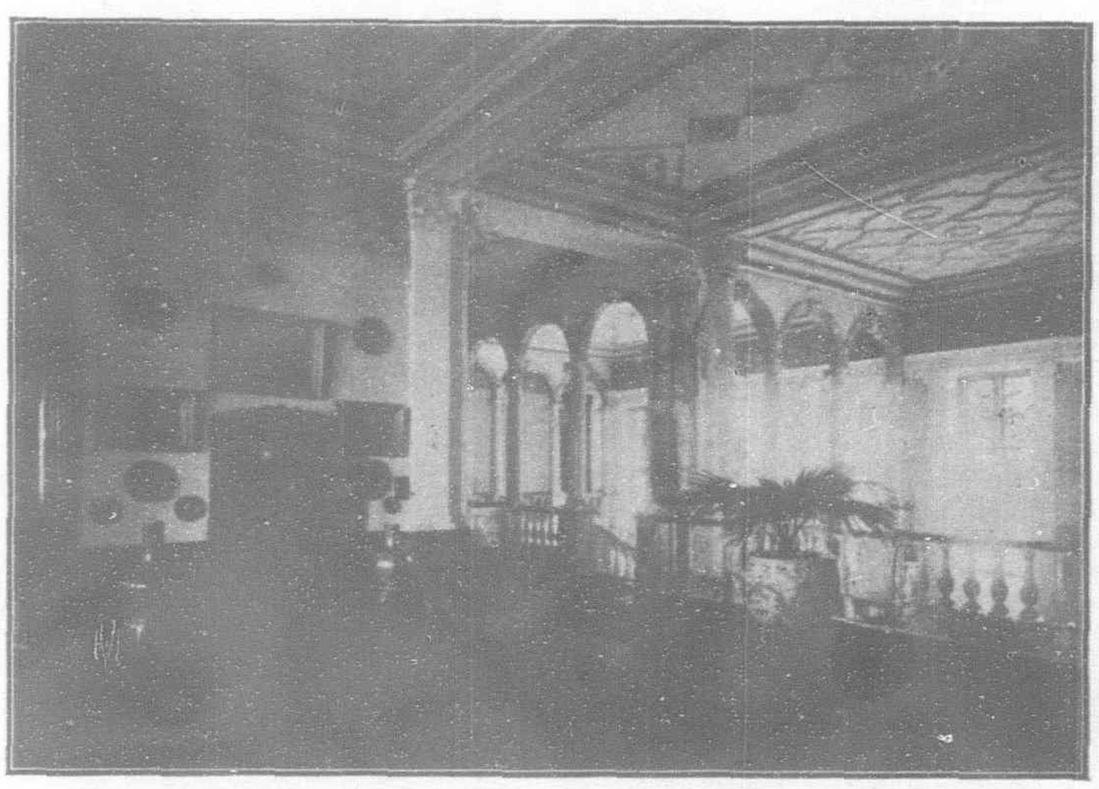
THE ENTRANCE.—Looking at the building as a whole, one is struck by its stately proportions, and finely-finished exterior. The porch, which is reached by curving steps at each side, stands out prominently from the structure. It is ornate, though by no means florid, in design, the archway being elaborately carved in stone. Corinthian columns stand on each side, and upon the pillars of the staircase rest Chinese lions, the work of Chinese sculptors at Foochow. From each side of the porch run long verandahs. Slender columns rise, those on the ground floor being Corinthian, while those above are Ionic. The main columns are Roman Doric design. At the entrance leading to the vestibule the floor is done in mosaic, imported from England, while the verandah floor is laid out in a plain design arranged with tiles. The main verandah is 125 ft. long and about 10 ft. wide. It circles right round the house.

THE MARBLE HALL.—Entering the hall from the vestibule, the visitor is immediately struck by the magnificence of the adornment. It may be that in the Orient there are equally fine houses, out the ordinary traveller seldom sees or hears qf them. From floor to ceiling, everything is marble. The lofty columns are of Skyros marble; the colonnade and the staircase are all marble, and even the supports of the staircase are of dark-grained marble of an exceeding rich appearance. All the marble came from Athens, and was imported from the Marmor Company, famous for its marble work in Europe. The staircase is in white marble, while the ornate ceiling and tessalated flooring complete a scene which, if one were not thought over-extravagant, might be termed gorgeous.

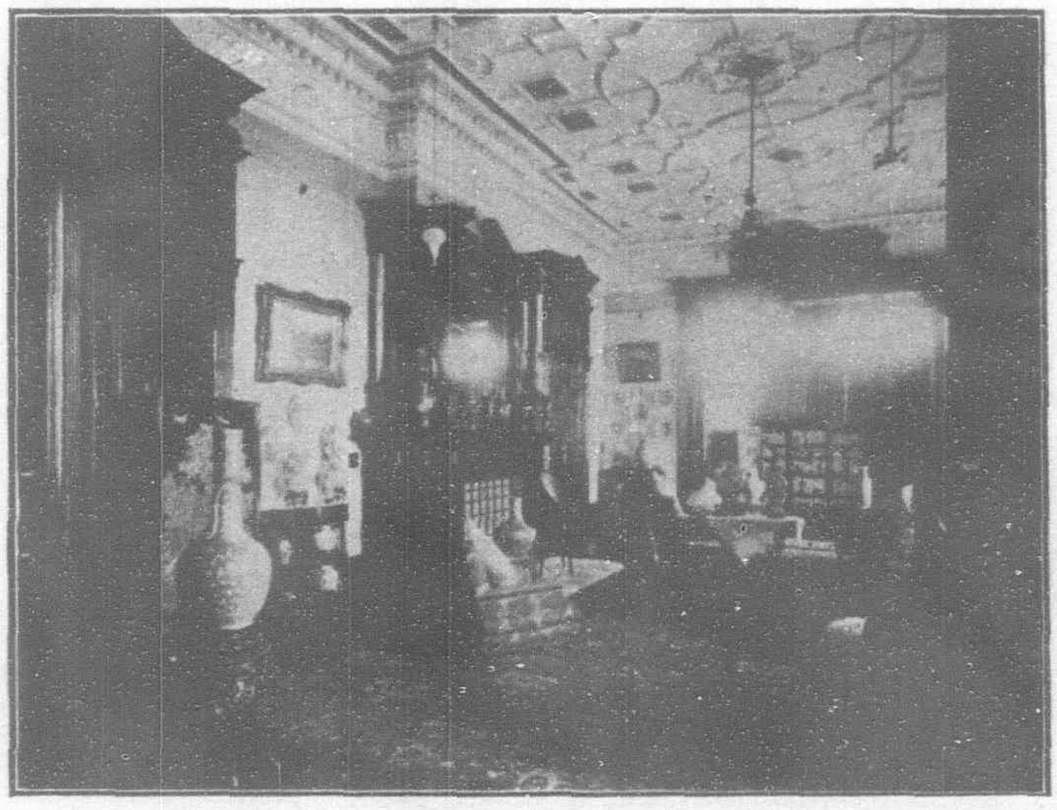
ELABORATE EMBELLISHMENTS.—The principal rooms—dining-room, drawing-room, billiard-room, and an apartment set apart for curios—are all on the first floor, radiating from the entrance hall. Each is furnished with folding-doors, elaborately carved in teak—no wood but teak is used throughout the building—and the great bow-windows are framed in stained-glass of chaste patterns. There are folding doors leading to the drawing-room, which is 37 ft. long by 24 ft. wide. All the woodwork presents an appearance of solidity in keeping with the general design of the interior. Beyond is the dining-room, similar in size to the drawing-room. The ceiling in each apartment is diversified with plaster work patterns, and whole teakwood openings afford ventilation. A freize goes round the top of the walls, and electric lights at each corner, and also suspended from the ceiling, convert night into day when the switch is turned. On the opposite side of the hall are the curio and billiard rooms. The freize under the cornice in the curio room is unusually tasteful in design, Madonna-like faces being circled by leaf patterns, and as the work was done by Chinese workmen on the spot it reflects the greatest credit on the ability of local tradesmen. The billiard-room is a well lighted chamber, quietly ornamented so far as the freize and character of the ceiling are concerned. As already stated, all the four principal rooms are of the same size, 37 ft. by 24 ft. and all are accessible to each other, besides affording easy entrance to the main corridor, the verandah, and the hall.

SIDE ENTRANCE AND OTHER CONVENIENCES.—At the rear of the dining-room there is a spacious tiled pantry, and a commodious kitchen, which is furnished with an up-to-date cooking apparatus, and a high pressure boiler for supplying hot water to every part of the house. The kitchen and adjacent rooms have the floors tiled, while the walls also up to the roof are of white, glazed sanitary tiles, so that everything should be spotlessly clean and free from the insistent microbe. There are the usual sculleries and such-like rooms, all built after the same pattern. A side-porch and private entrance leads, from the west side of the building, and it, also, has been carried out in the same lavish style as that distinguishing the main entrance. There are marble columns at each side of the corridor, and a scheme of ornate decoration along the walls. Indeed, the side entrance would, by most people, be considered a sight in itself, but it seems to pall after one has inspected the main hall and marble staircase.

PALATIAL BEDROOMS.—The upper floor, then, is given over almost entirely to four bedrooms. On arriving at the top of the marble staircase, one enters a large and lofty apartment which may be either a hall or a sort of drawing-room. It looks immediately over the portico and has a fine verandah whence one may overlook the harbor. The vista, indeed, extends to the borders of British territory on the N., E. and W. At each side are two bedrooms, vastly different from the ordinary style of bedroom. These are spacious and elaborately-finished apartments,



MARBLE STAIRS, FIRST FLOOR; TAKEN FROM THE LANDING



CURIO ROOM; TAKEN FROM THE HALL WITH SLIDING DOOR OPEN

decorated in the most palatial style. The fireplaces and mantels alone are worthy of attention. In one chamber the mantel, of pure white marble, is flanked by two cupids beautifully carved, while in the centre, above the fire, two raised doves appear. It is a representation of high art in sculpture and forms a feast for the eyes. In another bedroom the mantel, also of white marble, has at each side a magnificent specimen of the heron, whose long neck is curved, the bill resting on the breast. The careful modelling of the breast feathers, and the chiselling of the head and bill show that the work was not performed by any perfunctory artist but by one who took a pride in his productions. The other two mantels have not yet been placed in position, but, of course, they will be equally fine and worthy of inspection.

ADJUNCT APARTMENTS.—In conjunction with each bedroom there is a bathroom and lavatory. The bathroom is the embodiment of what such a chamber should be; it resembles nothing so much as one of those rooms in London's finest hotels. There is an enamelled bath, with hot and cold water circulation laid on, sprays, etc.; the electric light is provided there as in all the rooms, and the lavatory is replete with all the accessories essential to that virtue which is next to godliness. Each bedroom is adequately lighted by folding doors and windows, and each room leads directly upon a private verandah.

MAGNIFICENT VISTA.— It is from this story that the greatest view of the city, harbor, and surrounding district is obtainable. The vista is one of the charms of the place, for wherever the eye rests it lights upon a scene scarcely to be surpassed in changeful beauty and ever-beautiful change. As far as one can see lies the Lye-mun Pass; the serrated mountain peaks, with their grey and yellow ridges rising in serpentine folds from the valleys till they are lost on the summit of the mountains, are immediately in front; in the middle distance is the harbor with its ceaseless tide of bellying sails, unwieldy junks and skittish sampans, while the more dignified steamships gaze mastiff-like at the jerky *puffing billies* of launches, which hasten hither and thither like evil spirits; Kowloon, also, is stretched out in clear perspective; and at the W. side there is a long distant view of the ocean which most of us have crossed before we sought Hongkong's shores. It is needless to enlarge on this festive of the mansion, which is itself an example of the beautiful, but it is a factor in the life of those who will inhabit the mansion which none can overlook or forget.

PLEASANT FOR THE COOLIES.—Coming back to the prosaic, the servants, quarters are provided for at the rear of the main building. Out-houses, away from the mansion itself, have been built for the house coolies, chair-carriers, etc., and there the coolies find themselves installed in quarters which must lead them to believe that they have found an earthly paradise. There are rooms for stores, linen, washing and drying rooms, and such like. A circular staircase leads to the roof while a back staircase connects by means of a bridge with the main building.

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## ARTIFICIAL IRRIGATION IN CHINA

Mr. James Hutson, a British writer, gives an interesting account of the Kuan-Hsien river system, which narrates the conditions of life in the Chen-tu Plain of China. This vast plain of some 5,000 sq. ms. in area, is irrigated by the water system here explained, and is thereby one of the most fertile plains of China. It is said by the Chinese that the Chen-tu Plain originally was a vast marsh, through which the waters of the Min River flowed at will; and the casual observer might easily see that the present state of the works has been a gradual evolution, and doubtless many heads and hands have combined, many ways and means have been tried, and much treasure spent in order to regulate the wild and chaotic waters and introduce a system of artificial irrigation.

The waters of the Min River, flowing in a SE. direction, emerge from the mountains at Kuan Hsien a seething torrent. About 200 B, C. (as far as can be ascertained from the unreliable Chinese histories) a Chinese official, named Li-ping, entertained the idea of using these waters for irrigating and fertilizing purposes. To attain his object he cut away the end of the hill on which the W. wall of Kuan Hsien City now stands; making a cutting through the lower part of the W. arm of this hill, he thus formed an artificial gorge at the SW. corner of the city, through which he led a part of the Min River, which afterwards continued its course close by the S. wall of the city and then off in a NE. direction, the other half of the river continuing in its S. course to Kiang-k'eo and Sui Fu, where it joins the Yangtsze. The part of the river which flows through the gorge is colloquially and officially called the "inner river," the other half being called the "outer river." The waters of the "inner river," after passing through the gorge, are again subdivided into three main streams. All along the banks of these streams there are minor divisions, irrigation dams, or water-wheels which lead the water into smaller canals for domestic and agricultural uses in scores of towns and hamlets on the wast Chen-tu plain, thus transforming a once desolate region into a fruitful and well-watered garden.

About December 1st the yearly operation of repairing the river bed begins by cutting off the waters of the "outer river," sending all the water for the time being into the "inner river." This work is only possible in winter when the river is low, owing to the diminished rainfall and the frost on the Thibetan Uplands. When the waters are dry the digging operations begin. The large stones are carried to the river banks, the channel is scraped level, and the banks are made up with long bamboo baskets closely packed with cobble stones. When this is done the waters of the "outer river" are allowed to return to their original course; and then the "inner river" is dried up in a similar way. In the bed of the "inner river" between the foot of the hill and the overflow, two large iron bars are placed. These bars are said to have once been placed higher up in the river, but were carried down to this spot on the flood tide. At this point the waters of the river strike forcibly against the artificial banks of the overflow, and much silt is thrown back and deposited in mid-stream, covering these bars to the depth of several feet. When the river bed is cleared out, these bars serve as a guide to the contractors as to the depth they have to dig; they must be unearthed and left lying quite bare, or the officials will not pass the work. One bar bears an inscription dating from the Ming dynasty and the fourth year of the reign of the Emperor Wan-lih, about A. D. 1576. The other bar is of more modern times, dating from the present dynasty and the third year of the reign of the Emperor Tung-chi, about A. D. 1865. The bars are about 10 ft. long, and estimated by the Chinese to be about 3,000 lbs. each. The Chinese have unconsciously accomplished a great engineering feat, and this work has been going on for over 2,000 yrs.

The rule laid down by Li-ping for the management of the work is a wise and safe one, and doubtless is the secret of its success. It has been handed down from posterity, and is still deeply revered by the people. It is this: "Dig the channels deep and keep the banks low." This is the exact opposite of what China has done with the Yellow River.

For this work it is estimated that Tls. 1,500 are spent on rice to feed the coolies, Tls. 1,800 on bamboo, and Tls. 3,500 on labor, bringing the yearly expenditure up to Tls. 6,800, or about £850, but the yearly expenditure varies according to the damage done by the river. The districts getting full or partial advantage from the water are about 10, with a probable acreage of 25,000 *meo* (*meo* = $\frac{1}{8}$ of acre). These lands have a water tax imposed which realizes about Tls. 1,000, or about $\frac{1}{8}$ part of the whole expenditure. The remainder is paid from the land tax, and is obtained by the "inspector of waterworks" from the provincial treasurer through the intendent of circuit. The above does not show all the expenditure, but only that connected with the main divisions of the river. The minor divisions are either managed by private individuals or public subscription.

Generally about April 1st, or a little earlier, when repairs of the river are nearing completion, the inspector of waterworks selects a "lucky" day, and invites the intendent of circuit to come and inspect the work and open the river. This is an event of great importance to everybody, carried out with great ceremony. Large numbers of people line the banks to see the water come down, and its volume is often taken as a forecast of what the year's water supply will be like. By the time the "great man" has reached the city on his return journey the water has arrived, and if there is a good supply it reaches the capital before him. About May 1st the inner river is officially opened to raft traffic by the ceremony of sacrificing to the god of the river. It then remains open till January when it is closed for cleaning, but a few go to other places.

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## DEVELOPMENT OF CHEUNG-SHA

Since the taking over of the New Territory, Hongkong, by the British, according to Li Sum Ling, a progressive Chinese of that place, many improvements have been effected. Cheung Sha-Wan, many years ago, was studded with barren rocks on a sandy bank, with here and there groups of houses known as the Hakka villages, and for great distances no human beings were in sight. It is now blocked up with Chinese ship-building yards and a great number of steam launches and junks are being turned out every year. Along the coast one may see an improvement in the shape of the China and Japan Telephone and Electric Company's telephone wire leading to the W. to connect one of the offices of the Standard Oil Company. Not far away from the Chinese ship-building yards, there are heaps of old Chinese bricks belonging to the Fook Tin Tong, which owns large landed properties in Cheung-Sha-Wan.

Before the occupation of the place by the British, the late Li Sing, a Hongkong millionaire, purchased a vast piece of land there with a view to opening up the place. To attain his object, he bought a large quantity of building material which had broken down in the Taiping Shan Districts and after spending an immense fortune and much labor conveyed it over to Cheung-Sha-Wan. At one time, about 13 yrs. ago, a contractor went so far as to contract for the building of a row of houses on the shore of Cheung-Sha-Wan, but before completing construction, a typhoon came on and the half-built houses were reduced to the ground, to the great loss of the contractor. Since then no attempt had been made to restore the buildings. After a time the great millionaire died, followed by the passing of lands into the hands of the British, and the idea of developing the place was given up. The hundreds of thousands of bricks were sold, and what remains now represents the dead stocks which are unsaleable. The Fook Tin Tong, which belonged to the millionaire and others, still owns properties there, having a very dirty office in the charge of one or two of the company's employés situated not far away from Tsang King's workmen's quarters for the construction of the water-works there. Passing the South African laborers' quarters one notices the old broken-down offices which were formerly occupied by the Imperial Chinese Customs many many years ago. Further up the hill is a stone place which the natives say belonged to a Company which was formed for the purpose of brewing, but the company has now become defunct. The half-finished works, however, still remain. With a good water supply near at hand, one cannot help thinking that some day great industrial works will conmmence. Among the valleys are cornfields, fertile and rich. Cotton agriculture should be encouraged there. Judging from the rich corn crops, cotton cultivation would undoubtedly yield a rich harvest. Many natives are of the opinion that as soon as the Canton-Kowloon Railway is completed the market for fruits and vegetables will become greater as the Province of Kwangtung and the neighboring districts are the best fruit-producing places. A number of people have taken advantage of the fact that as soon as the Canton-Hankow Railway is constructed, a great demand for fruits for the northern countries will be assured, to plant a great number of sweet oranges, pumeloes, and other fruits.

# SUCCESSFUL TEST OF POLILLO (PHILIPPINE ISLANDS) COAL, AND REPORTS OF EXPERTS ON SAME

## (By Order of Governor-General Luke E. Wright.)

The Polillo Land Improvement Company, of Manila, P. I., has just received the certified results of an official test made by government experts at the Bureau of Insular Cold Storage and Ice Plant, in this city, of its coal. The fuel was brought to Manila from the company's mines on the Island of Polillo, Philippine Islands, in sufficient quantity to carry out a 24-hours' test at the insular ice plant, which was generously placed at the disposal of the company by Governor-General Wright, whose interest in the result has been keen from the beginning. The Governor-General went even further than this by having the test made under the direct supervision of three expert mechanical engineers in the government service, assisted by experts of the Bureau of Science, thus guarding the company against possible claims of interested outsiders that the test had not been impartially made. The vein of the Polillo mines has a 9-ft. face and is apparently inexhaustible.

The test from every view-point exceeded the hopes and expectations of the most sanguine shareholders in the company. As it was the first exhaustive test of any magnitude of the commercial value of Philippine coal, ever made in these Islands, its successful issue portends great activity in the coal mining industry of the archipelago. The test was made at the ice plant on December 21st, 1905, and following are the details of how it was conducted, together with the results obtained:—

DEPARTMENT OF FINANCE AND JUSTICE, MANILA, P. I.—*Bureau of Insular Cold Storage and Ice Plant, Office of the Director, January* 3d, 1906. MR. LOUIS T. GRANT, Trustee of the Polillo Land Improvement Company, Manila, P. I. Sir:—I am sending you under separate cover an exhaustive report prepared by the committee appointed to make a 24-hr. test of the coal mined by your company and delivered to this bureau in December, 1905.

Your company is to be congratulated upon the result of the test, which would indicate that your coal is at least equal to the Japanese and Australian coals to be obtained in the local market. With respect to ashes and smoke it was much superior to either of these, the percentage of ash being less than from any coal that has ever been burned in these furnaces. The total consumption for the 24 hrs. was 18 tons and 1949 lbs., the plant being operated at practically its full capacity.—Very respectfully, (Signed) J. F. EDMISTON, *Director of Cold Storage.*

REPORT OF THE COAL TEST.—*Manila, P. I., January* 3d, 1906. MR. J. F. EDMISTON, Director of Cold Storage, Manila, P. I. Sir:—I have the honor to submit the enclosed report of a coal test made at this plant on December 21st, for the purpose of determining the commercial efficiency of a native coal, mined on the Island of Polillo, by the Polillo Land Improvement Company, in accordance with instructions received from you to conduct the test and make a complete report thereon, trusting that the same will be satisfactory.—Very respectfully, (Signed) J. J. O'DONOVAN, *Chief Engineer, Bureau of Cold Storage.*

*Manila, P. I., January* 3d, 1906.—The Polillo Land Improvement Company, Manila, P. I. Gentlemen:—The committee appointed to conduct a test of the coal mined on the Island of Polillo, by your company, beg leave to submit the following report, which, for convenience of reference, is divided into three sections. *First*, the remarks and comments of the committee upon the details of the test, the condition and appearance of the coal, and the manner in which it was consumed. *Secondly*, the commercial test, this being of most important interest to the manufacturer or steam user, since the cost of producing steam is the real method by which the efficiency of any fuel may be judged. *Thirdly*, since the economy of a fuel is nearly synor nymous with the efficiency of a boiler, as a mattes of engineering simply, the commercial test ir supplemented by an engineering test, in ordethat the economy and efficiency of the fuel, might be more fully determined.

In conclusion, we desire to express our high appreciation of the courtesies, and invaluable assistance extended to us by Mr. J. F. Edmiston, Director of the Bureau of Cold Storage, and Dr. Paul C. Freer, Director of the Bureau of Science.—Very respectfully, (Signed) J. J. O'DONOVAN, *Chief Engineer, Bureau of Cold Storage;* D. MCCHESNEY, *Master Mechanic, Depot Quartermaster's Department;* W. P. WILLIAMS, *Chief Engineer, Bureau of Science.*

DETAILS OF THE TEST.—The coal was received at the Bureau of Cold Storage, in sacks, 3 days before the test was made. It was in dry condition, and several samples were taken from the pile, thoroughly mixed together, and sent to the Bureau of Science for analysis.

All the instruments used during the test were carefully standardized, and type-written log sheets were placed at each station where data for the test was to be established, and every precaution was taken to guard against the possibility of errors being made.

The test was commenced at 8 a. m. December 21st, and ended at 8 a. m., December 22d, thus continuing throughout 24 hrs. The test was divided into three periods of 8 hrs. each, corresponding to the engine-room watches, which were from 8 a. m. to 4 p. m., from 4. p m. to midnight, and from midnight to 8 a. m. Before the commencement of the test the fire was thoroughly cleaned, and the small amount of live coal left upon the grate was carefully estimated. At the end of the test, the fire was again cleaned a short time before 8 a. m., December 22d, and the same amount of live coal left upon the grate as at the start.

Throughout the test all conditions were maintained as uniformly as possible, the same amount of work being done at all times. The water-level in the boiler was kept at the same height, and the feed water was practically the same temperature. A throttling steam calorimeter was used to determine the moisture in the steam, the flue gases were drawn off and tested by a chemist detailed for that purpose from the Bureau of Science, and the temperature of the flue gases was determined by a mercurial thermometer, inserted in a pipe through the center of the flue. The weight of the coal used and its proportion of combustible matter, were accurately determined. The exact weight of the water evaporated under the known conditions of the test was determined with the utmost exactness, as well as the percentage of moisture in the steam. Throughout the test the records were checked and verified by related observations.

COMPOSITION OF THE COAL.—The color of the coal is dark brown, and when broken the surfaces displayed show a layer of carbon which appears dull and lustreless; the fracture of the coal, when broken across, has a somewhat resinous appearance. It is a free-burning non-caking coal, and burns with a pale yellow flame It lights easily and burns well, the coal breaking apart under the action of the heat. It gives off a brown smoke which is not dense and makes little ash, the coal being almost entirely consumed. In this it resembles the better grades of Welsh coal. Much of the ash made was caused by the finer particles of the coal dropping through the grate. This ash was burned over gaina on the last two watches.

The fire burned without being cleaned, from 8 a. m. until 3:30 p. m., when it was broken up with a slicebar and 58 lbs. of clinker, or solid matter, taken from it. The remained ash was light and powdery in appearance. The fire was not again worked with either slicebar or rake until 10:30 p. m., when it was thoroughly cleaned, and 64 lbs. of clinker taken from it. The fire was again broken up at 3 a. m., but not cleaned. It then burned well, and was cleaned before the end of the test at 8 a. m., at which time the quantity of solid matter removed from it was 68 lbs.

The percentage of carbon in the form of decrepitated coal which was in the ash, may be reduced by using a closer grate and a more skillful manipulation. This would be determined after the coal had been used in a plant for a short time. The carbon contained in the ash was, broadly speaking, about 60 per cent.

The practical efficiency of a given coal is dependent, not only on its chemical composition and theoretical heat value, but to a great degree upon its purity, and the admixture of earths, moisture or other foreign matters which it contains. The percentage of ash being small when compared with other coals, it follows that the thermal efficiency of the coal is proportionately increased, and from a commercial standpoint this small percentage of ash decreases the original cost of freight and handling, per heat unit derived, as well as the expense of removal of the same. These facts should command careful attention.

DIMENSIONS OF BOILER.—Kind of boiler, Babcock & Wilcox water-tube boiler; horse-power (builder's rating) 200; number of drums, 2; diameter of drums, 36 ins.; length of drums, 23 ft. by $3\frac{5}{8}$ ins..; number of tubes, 108; outside diameter of tubes, 4. ins; length of tubes, 18 ft.; furnace (length and width), $6\frac{1}{2}$ ft. by $7\frac{1}{2}$ ft.; area of grate surface, 48.75 sq. ft.; area of heating surface, 2,000 sq. ft.; area of draft between tubes, 26.5 sq. ft.; ratio of grate surface to heating surface, 1 to 41; ratio of draft area to grate surface, .5435; ratio of area of grate to area of air space in grate, 2.15 to 1; area of damper opening at boiler, 8.55 sq. ft.; ratio of grate surface to area of damper opening, 5.7; area of chimney, 19.635 sq. ft.; height of chimney, 140 ft.; total area of air space in grate, 22.6 sq. ft.; total area of solid grate, 26.1 sq. ft.

COMMERCIAL TEST IN DETAIL.—*Manner of Start and Stop, and Kind of Run.*—The alternate method was used, in which the fire was cleaned and the amount of live coal left on the grate estimated. At the end of the test the fire was again cleaned, and the same amount of coal left on the grate. The run was continuous, and all conditions were maintained exactly the same. *Duration of Test*—24 hrs. *Total Coal Consumed.*—41,264 lbs. *Coal Consumed per Watch.*—From 8 a. m. to 4 p. m., 14,239 lbs.; from 4 p. m. to 12 a. m., 13,677 lbs.; from 12 a. m. to 8 a. m., 13,348 lbs. *Total Ash and Refuse.*—2,241 lbs. *Ash and Refuse per Watch.*—From 8 a. m. to 4 p. m., 764 lbs.; from 4. p. m. to 12 a. m. 853 lbs.; from 12 a. m. to 8 a. m., 624 lbs. (Note: The increase in ash in the middle watch was caused by cleaning the fire thoroughly. *Percentage of Ash*—5.43. *Percentage of Ash per Watch.*—From 8 a. m. to 4 p. m., 5.36; from 4 p. m. to 12 a. m., 6.23; from 12 a. m. to 8 a. m., 4.67. *Total Water Evaporated*—238,083$\frac{1}{3}$ lbs. *Water Evaporated per Watch*—From 8 a. m. to 4 p. m., 78,916$\frac{2}{3}$ lbs.; from 4 p. m. to 12 a. m., 79,250 lbs.; from 12 a. m. to 8 a. m., 79,916$\frac{2}{3}$ lbs. *Average Coal Burned per Hr.*—1,719$\frac{1}{3}$ lbs. *Average Coal Burned per hr. per Watch*—From 8 a. m. to 4 p. m., 1,779$\frac{7}{8}$ lbs.; from 4 p. m. to 12 a. m., 1,709$\frac{5}{8}$ lbs.; from 12 a. m. to 8 a. m., 1,668$\frac{1}{2}$ lbs *Average Coal Burned per sq. ft. of Grate per Hr.*—35.268 lbs. *Average Coal Burned per sq. ft. of Grate per hr. per Watch*—From 8 a. m. to 4 p. m., 36.51 lbs.; from 4 p. m. to 12 a. m., 35.069 lbs.; from 12 a. m. to 8 a. m., 34.225 lbs. *Average Quantity of Water Evaporated per hr.*—9,920.138 lbs. *Average Quantity of Water Evaporated per hr. per Watch*—From 8 a. m. to 4 p. m., 9,864.583 lbs.; from 4 p. m. to 12 a. m., 9,906.25 lbs.; from 12 a. m. to 8 a. m., 9,989.583 lbs. *Average Quantity of Water Evaporated. per hr. per sq. ft. of Heating Surface*—4.96 lbs. *Average Quantity of Water Evaporated per hr. per sq. ft. of Heating Surface per Watch.*—From 8 a. m. to 4 p. m., 4.9328 lbs.; from 4 p. m. to 12 a. m., 4.9531 lbs.; from 12 a. m. to 8 a. m., 4.9948 lbs. *Commercial h. p. Developed on Basis of 30 lbs. of Water Evaporated into Steam of 70 lbs. Gauge Pressure, from Feed Water of 100° F.*—323.331 h. p. *Commercial h. p. Developed at the Preceding Rating.*

*per Watch.*—From 8 a. m. to 4 p. m., 321.4209 h. p.; 4 p. m. to 12 a. m., 322.7456 h. p.; 12 a. m. to 8 a. m., 325.4939 h. p. *Average Boiler Pressure.*—155 lbs. *Average Temperature of Feed Water*—140.88 F. *Average Temperature of Feed Water per Watch*—From 8 a. m. to 4 p. m., 140.88° F.; from 4 p. m. to 12 a. m., 140.93° F.; from 12 a. m. to 8 a. m., 140.85° F. *Average Temperature of Escaping Gases*—513.66° F. *Average Temperature of Escaping Gases per Watch.*—From 8 a. m. to 4 p. m., 509° F.; from 4 p. m. to 12 a. m., 517° F.; from 12 a. m. to 8 a. m., 515° F. *Force of Draft Measured in ins. of Water.*—.85 in *Average Quantity of Water Evaporated per lb. of Coal, as Brought from Coal Pile.*—5.7697 lbs. *Average Quantity of Water Evaporated as Preceding, per Watch*—From 8 a. m. to 4 p. m., 5.5422 lbs.; from 4 p. m. to 12 a. m., 5.7943 lbs.; from 12 a. m. to 8 a. m., 5.9871 lbs.

Economic Evaporation.—*Moisture in Coal*—5 per cent. *Water Actually Evaporated per lb. of Dry Coal, from Actual Pressure and Temperature.*—6.0734 lbs. *Water Actually Evaporated per lb. of dry coal, as Preceding, per Watch*—From 8 a. m. to 4 p. m., 5.8339 lbs.; from 4 p. m. to 12 a. m., 6.0994 lbs.; from 12 a. m. to 8 a. m., 6.3023 lbs. *Equivalent Water Evaporated per lb. Dry Coal, from and at 212°*—6.8246 lbs. *Equivalent Evaporation as preceding, per Watch.*—From 8 a. m. to 4 p. m., 6.5555 lbs.; from 4 p. m. to 12 a. m., 6.8533 lbs.; from 12 a. m. to 8 a. m., 7.0819 lbs. *Equivalent Water Evaporated per lb. of Combustible, from and at 212°*—7.2377 lbs. *Equivalent Water Evaporated per lb. of Combustible, as Preceding, per Watch.*—From 8 a. m. to 4 p. m., 6.9476 lbs.; from 4 p. m. to 12 a. m., 7.3342 lbs.; from 12 a. m. to 8 a. m., 7.4480 lbs.

Commercial Evaporation.—*Equivalent Water Evaporated, per lb. of Dry Coal with* $\frac{1}{6}$th *Refuse, at 70 lbs. Gauge Pressure, from Temperature, of 100°*—5.2470 lbs. *Equivalent Water Evaporated per lb. of dry Coal with* $\frac{1}{6}$th *Refuse, as Preceding per Watch*—From 8 a. m. to 4 p. m., 5.0360 lbs.; from 4 p. m. to 12 a. m., 5.3165 lbs.; from 12 a. m. to 8 a. m., 5.3990 lbs.

Data and Results of the Evaporative Test.—*Manner of Start and Stop*—Running, with thin fire. *Kind of Run*—Continuous. *Duration*—24 hrs. *State of the Weather*—Fair. *Grate Surface*—48.75 sq. ft. *Heating Surface*—2,000 sq. ft. *Ratio of Heating Surface to Grate*—41. *Average Pressure*—Steam pressure by gauge 155 lbs.; atmospheric pressure, 29.80 ins.; draft in ins. of water, .85 in.; pressure per sq. ft. due to unbalanced column of air in chimney .4913 oz. *Average Temperature*—External air, 85.92° F.; fire room, 88.64° F.; steam, 368.62° F.; escaping gases, 513.66° F.; water entering heater, 89.56° F.; water entering boiler, 140.88° F. *Fuel*—Total quantity of coal fired, 41,264 lbs.; moisture in coal, 5 per cent; dry coal consumed, 39,200.8 lbs.; total ash and refuse (dry), 2,241 lbs.; total combustible consumed, 39,960 lbs.; per centage of ash, 5.43; dry coal consumed per hr., 1633.367 lbs.; combustible consumed per hr., 1,540 lbs.; dry coal consumed per sq. ft. of grate per hr., 33.5 lbs.; dry coal consumed per sq. ft. of heating surface per hr., .816 lb.; combustible consumed per sq. ft. of grate per hr., 31.589 lbs.; combustible consumed per sq. ft. of heating surface per hr., .770 lb.; average amount of coal fires each time, 100 lbs.; average time between firing, 4 min.; average number of shovelfuls fired each time, 6.5.

Bureau of Science Analysis.—*Proximate Analysis of Coal.*—Fixed carbon, 43.3 per cent; volatile matter, 48 per cent; moisture, 5 per cent; ash, 3.7 per cent. *Analysis of Ash*—Moisture, 2.4 per cent; combustible matter, 62.6 per cent; *Analysis of Clinker*—Moisture, 0.6 per cent; combustible matter, 12.2 per cent. *Heating Power of Coal*—Heat units per lb. of coal, B. T. U. 12,154. *Results of Calorimeteric Tests*—Average of thermometer, 268° F.; quality of steam (dry steam being taken as unity), .9757; percentage of moisture in steam, 2.43.

Water.—Total weight of water pumped into the boiler and apparently evaporated, 238,083 $\frac{1}{3}$ lbs.; water actually evaporated (corrected for quality of steam), 232,297.9083 lbs.; equivalent water evaporated from and at 212° F., 267,534.2416 lbs.; equivalent water evaporated into dry steam, from and at 212° F., 261,033.1595 lbs.; factor of evaporation, 1.1237. *Water Used per Hr.*—Water evaporated per hr., 9,920.1380 lbs.; water evaporated per hr. (corrected for quality of steam), 9,679.0786 lbs.; equivalent evaporation per hr. from and at 212° F., 11,147-.2591 lbs.; equivalent evaporation per hr. from and at 212° F. (corrected for quality of steam), 10,876.3806 lbs. *Economic Evaporation*—Water actually evaporated per lb. of dry coal (from actual pressure and temperature), 6.0734 lbs.; equivalent water evaporated per lb. of dry coal, from and at 212° F., 6.8246 lbs.; equivalent water evaporated per lb. of combustible, from and at 212° F., 7.2377 lbs. *Commercial Evaporation*—Equivalent water evaporated per lb. of dry coal, with $\frac{1}{6}$th refuse at 70 lbs. gauge pressure, from feed water at 100° F., 5.2470 lbs. *Rate of Evaporation*—Water evaporated from and at 212° F. per sq. ft. of heating surface per hr., 5.5736 lbs.; water evaporated from and at 212° F. per sq. ft. of grate surface per hr., 228.66 lbs.; water evaporated from and at 212° F. per sq. ft. of least area of draft, 1,303.77 lbs. *Commercial H. P.*—Commercial h. p. developed on basis of 30 lbs. of water evaporated into steam of 70 lbs. gauge pressure from feed water of 100° F., 323.231 h. p.; h. p. (builder's rating) 200; per cent developed above builder's rating, 61.87.

## CONSTRUCTION OF THE CANTON-SAM SHUI BRANCH OF THE CANTON-HANKOW RAILWAY

*(Concluded from page 203)*

Concrete for bridge foundations was composed of 1 part cement, 3 parts sand, and 5 parts broken stone. This cost in place from $10 to $14 per cub. yd., exclusive of cost of cofferdams when used, which added from $1 to $2 per cub. yd. The cement used was the "Green Island" brand which is one of the best cements in the Orient and very satisfactory to use on account of its uniformity. Sand of a most excellent quality was found in the immediate neighborhood while the broken stone came from the North River and cost about $2 per cub. yd.

Oregon Pine was used for forms, false work, etc., and cost in Canton $70 per 1000 ft.

Rolling Stock.—The rolling stock is all of American make. Eight second-hand locomotives of the Manhattan Elevated Railroad were bought for $3000 gold each, and sent out for temporary and construction purposes. The standard locomotives weigh about 80 tons complete and were built by the Pittsburg Locomotive Works. Two of them are in use now and they are very common-sense and up-to-date machines. Twenty 40-ton flatcars were sent out before the branch was completed and it was necessary to transform these into temporary passenger coaches. This was done by the user of rough Oregon Pine, boarding them up half way, putting on a roof covered with "P. & B." roofing, and furnished with four long benches running lengthwise of the coach. The first class coaches were the same except the benches were either covered with Canton matting or replaced with bamboo chairs and had Canton matting on the floors.

The next step was the conversion of boxcars into passenger coaches, which was performed by putting in benches and cutting two small windows on either side. After a few months first, second and third-class coaches were sent out, also baggage cars.

This branch commenced to pay after the first month that it was put in operation. The increase in volume of passenger traffic was steady for 15 mos., when very nearly the maximum was reached. Since then the increase has been slow. The receipts of this line average from $50,000 to $60,000 per mo., and the operating expenses are about 25 per cent. This makes a very creditable showing for Mr. Lind, the efficient traffic manager. An express freight has been established which is growing in popularity, and which is sure eventually to get all traffic in valuable cargo, such as specie, silks, tea, etc. It will be sometime, if ever, before this line will do a large freight business for waterways are everywhere and afford a cheap, if slow, means of transportation, and time is no object to the average Chinaman in his common everyday affairs.

The Main Line.—Construction was begun on the main line in January, 1904, and entirely suspended in October of the same year. During this time 12 ms. were practically completed from Canton to Ko Tong, with the exception of laying the rails over the last 6 ms. This work was not prosecuted vigorously as the money of the company began to get short and only a limited amount could be expended monthly. It was very unfortunate that these 12 ms. could not have been finished and put into operation, as they would have added very materially to the receipts of the company. On these 12 ms. there was one thorough cut which was about $\frac{1}{2}$ of a m. in length and at the summit 50 ft. deep, and contained 112,000 cub. yds. of material. A small industrial railway was used to haul the material in this cut to make the embankments on either end. The extreme haul was 3000 ft. and the cost was 25c. a yd. The bridges on this section were all small and single spans. At Ko Tong 15 6-ft. spans were to be put in. The foundations had not been built at the time of the closing down of the work but the spans were made and in the yard of the Wong Sha, or Canton terminal.

Engineering Lessons.—A summarization of the lessons this railway construction teaches to foreign engineers, and others undertaking construction work in China, is embodied in one axiom,—treat the Chinese fair and be patient. There is no man living who will do as much work, do it as cheerfully and for as little money as a Chinaman if he is treated right and handled properly. He has disagreeable attributes to be sure, but his good qualities more than offset them. It must be understood that he is of necessity almost entirely ignorant of modern methods of doing things, but he is very imitative and learns easily. When the Canton-Samshui division was put in operation all the locomotive drivers were foreigners with Chinese firemen. Within 1 yr. from the date of opening all the foreigners had been replaced by the native firemen and only one foreign expert driver retained to have general supervision over the rolling stock and teach new men. The same thing was done in handling the steam pile drivers At first the crew was made up of foreigners who were soon replaced with Chinese. This applied through all the work, and when construction was suspended there was very little need of skilled foreign foremen, as Chinese skilled workmen had been developed in all lines.

## JAPAN'S SHIPPING COMPETITION

The Tokyo correspondent of *The (London) Times* has this to say about the carrying trade of the Far East, with special reference to the rapidly-growing influence of Japan over maritime commerce in the Orient:—

The tendency of Japanese shipowners before the war with China was to confine their enterprise to domestic waters; but the expansion of national spirit caused by the war and the pressure of competition in coastwise seas owing to a plethora of carriers drove them further afield. It is thought that the latter movement may easily be carried still further. East Asia has become a chief arena of the world's diplomatic activity, and its commercial interest grows daily greater. Japan is the centre of that activity and that interest. Her foreign trade has swelled from 17,000,000 sterling in 1893 to 69,500,000 in 1904, and the tonnage employed in carrying it has increased in the same time from 9,000,000 to 27,000,000. The trade has quadrupled, the tonnage trebled. Turning to Chinese ports, we find that the entries and clearances aggregated at the corresponding dates 30,000,000 and 58,000,000 of tons respectively, a development of nearly double. Here, then, are two fields, that of her own oversea trade and that of the Chinese carrying trade, and Japan's share in them hitherto furnishes a measure of what may be expected for her hereafter. In Chinese ports, where the order in 1894 was England, Germany, Japan, the Japanese tonnage being only 1/5 of the British, Japan in 1904 had displaced Germany from the second place, and could show a tonnage equal to $\frac{1}{4}$ of the British. In Hongkong, too, Japan's shipping grew from 1/5 of the British figure in 1898 to $\frac{1}{3}$ of it in 1903.

# FAR EASTERN ENGINEERING, CONSTRUCTION, COMMERCIAL AND FINANCIAL NEWS

## PERSONAL

MESSRS. FABER & VOIGT, of Kobe and Yokohama, announce that they have established themselves at Hamburg.

MR. J. O. P. BLAND, secretary of the Municipal Council of Shanghai, a well-known writer of Chinese affairs, has resigned his post to join the service of the British and Chinese Corporation.

MR INGLIS, of London, general manager of the Great Western Railway Company, was reported to have been appointed general manager of the new docks and harbor to be constructed at Singapore, but *The London and China Express* says the appointment has not been made.

ROBERT G. DIECK, C. E., has been appointed city engineer of the Municipality of Manila, P. I., at the annual salary of ₱7,000, Philippine currency, and formally assumed his new position January 1st. Mr. Dieck was promoted from the position of acting city engineer. Formerly he was superintendent of the waterworks system of the city and has been in the municipal service since 1901.

## RAILWAYS, SUPPLIES, ETC.

ANTUNG-MUKDEN RAILWAY.—*The Japanese railway between Antung, in Korea, and Mukden, in Manchuria, has been completed.*

MAIL CONTRACT, STRAITS SETTLEMENTS.—The Railway Department will receive $9,708 this year from the government for the hauling of mails by train.

MALACCA-PULAU SEBANG RAILWAY, STRAITS SETTLEMENTS.—For completion of this railway, $100,000 appears in the present year's estimates.

EQUIPMENT, FEDERATED MALAY STATES.—During the current year the Railway Department of the Federated Malay States will purchase four locomotives and six carriages at an expenditure of $231,500.

CANTON-WHANGPOA RAILWAY.—The scheme for the railway between Canton and Whangpoa has been sanctioned by the Throne after being memorialized by the Board of Commercial Affairs.

KIANGSI-KUANGTUNG RAILWAY, CHINA.—The Board of Commerce at Peking has instructed the viceroy at Canton to submit a scheme for the construction of an inter-provincial railway system between Kiangsi and Kuangtung, and to find the necessary means for the purpose in view.

CANTON-AMOY RAILWAY, CHINA.—The first section of the Canton-Amoy line, which Chang Pat Chi, a millionaire from the Straits Settlements, is successfully promoting, is reported to start from the East Gate, Kwongchaufu, to Whampoa. The latter-named city will be the terminus of the line, and with a deep harbor at Whampoa it is intended to try and take commercial interests from Hongkong.

SWATOW-CHINCHOW LINE.—The Swatow-Chinchow Railway will probably be opened in the spring of 1906, as only a small portion of the line remains unfinished. When this line is completed it is quite likely that the constructors will direct their attention to the proposed Canton-Whampoa Railway, as their original intention was to connect this proposed line with the Swatow-Chinchow line.

DAGUPAN-CABANATUAN RAILWAY EXTENSION, LUZON, P. I.—An extension of the Manila Railway Company, Ltd., from Dagupan to Cabanatuan, Province of Nueva Ecija, is now open for public traffic. The new line brings a fine territory 70 ms. from Manila into direct communication with that city, and as the country which the line traverses is very rich, it may be expected that the company will before long be able to earn good returns from its investment.

PROPOSED KONGMUN-SUNGSUIHOW RAILWAY, CHINA.—It is reported that a proposal for a railway from Kongmun to Sungsuihow, a distance of about 20 ms., has been placed before Viceroy Shum by Chan Wai Hing. A capital of $1,000,000 has been agreed upon. It is the intention of the promoter of this line to connect it with the Sunning Railway. Sungsinghow is a business mart closely connected with Canton and Kongmun.

CANTON-HANKOW RAILWAY.—Since it was decided for the provinces of Kuangtung, Hunan, and Hupeh to construct, severally instead of conjointly, sections of the Canton-Hankow Railway, the gentries of the first two named provinces have been considering the ways and means of undertaking the work, but Hupeh has so far made no effort. Viceroy Chang Chih-t'ung has decided, however, to borrow from the treasury of the provincial salt intendent and from the reserve funds of his silk filatures and cotton yarn factories, which loans, to the total amount of Tls. 3,000,000, will be repaid when the railway is completed and begins to make money.

BORNEO RAILWAY.—The railway on the W. coast of Borneo seems to be stirring up the natives down that way. The Papar Bridge, having been carried away at the end of last October, has caused a great deal of delay and trouble with the transport across the river. Previous to the carrying away of the bridge trains were leaving Jesselton and Beaufort and arriving at their destinaton in 5 hrs. After the disaster, however, the delay at Papar was so great that the trains did not get in without being from 7 to 8 hrs. late. Now that the line has been opened again, great relief is experienced by the railway people.

IMPERIAL CHINESE RAILWAY ADMINISTRATION.—Sheng Kung-pao has wired to the Waiwupu and the Board of Commercial Affairs, Peking, that the Imperial Chinese Administration for the Peking-Hankow Railway having been established in Peking and Tang Shao-yih having been appointed director-general of the same, the Shanghai office of the Imperial Chinese Railway Administration should be abolished. The Waiwupu has memorialized the Throne to that effect, which has concurred in the recommendation. The Waiwupu has also secured the sanction of the Throne to have the railways between Tai Yuan and Chenting as well as Kaifeng-fu and Honan-fu administrated at the office of the Imperial Chinese Railway Administration.

KAWASAKI-KANAGAWA LINE, JAPAN.—The Kawasaki-Kanagawa section of the Keihin (Japan) Railway has been opened to traffic. The fare between Kanagawa and Shinagawa is 18 sen for single journey and 25 sen for return trip. The through fare for the Yokohama, Keihin, and Tokyo electric car lines will be 25 sen single journey. The government railway, now threatened with competition by the Keihin Electric Railway, will try to score by reducing the time of the journey between Yokohama and Tokyo. The electric tram will run between Kanagawa and Shinagawa—it is said—in 29 min. 30 sec. The government railway trains will endeavor to cover the distance between Yokohama and Shimbashi in 27 min. A trial run on that basis has been successfully carried out.

CANTON-AMOY RAILWAY.—The promoters of this line have submitted to the Board of Commerce, Peking, a scheme for its construction, and a prospectus embodying it is expected to be issued shortly. The Canton-Amoy Railway Company, Ltd., with a capital of Tls. 800,000 (8000 shares of Tls. 100, with a guarantee of an annual dividend of 6 per cent) has been floated for the purpose of constructing the line. The route starts from Tai Tung Mun, (E. of Canton), enters Whampoa, crosses Tsangshing, Tungkun, Shakloong, Waichow, Poklo, Hoilukfung, Chiuchow, then runs into Foekin and ends in Amoy. The company will enjoy supreme control for 60 yrs, and has been promised that no other railways will be allowed within 10 ms. on either sides of the Canton-Amoy Railway. In event of hostilities, the government shall have complete control of the line for the transportation of troops and other purposes. Provisions have also been made respecting telegraph along the line and railway guards as well as the management of the line.

RAILROADS IN CHINA.—Viceconsul Cloud, of Hangchow, writes to Washington that the Chinese have projected many lines of railway, concerning which there is much strong talk at the present moment. Among the more important of these are:—The Hankau-Canton line, recently bought back from the American-Belgian syndicate; the Peking-Kalgan line, on which work began last autumn; the Shanghai-Soochow-Hangchow-Ningpo line, formerly granted to a British syndicate, but whose concession has been canceled; the Tientsin-Chinkiang line, running almost straight S. from Tientsin to Chinkiang on the Yangtsze River; a line from Swatow to Amoy and Fuchau, along the coast; a line from Ich'ang, above Hankau, to Chungking in Szechuan, and a line from Chungking S. to connect with the French system in Yunnan. Besides these many shorter lines have been surveyed, and of which there is some promise.

NEW SHANSI RAILWAY, CHINA.—For some months past strenuous efforts have been made by the merchants and gentry of Shansi to float their railway scheme, and the Shansi governor recently submitted a memorial reporting the establishment of the Tung-pu Railway Company by the Shansi gentry and merchants for the protection of China's interests. The proposed line is from Taiyuan, the provincial capital, to Puchou in the S. and to Tatung in the N. covering an area of some 2,000 li, and the estimated cost some Tls. 20,000,000. The promoters are raising a sum of about Tls. 500,000 for the construction of the section between Taiyuan and P'ingyao at the outset. The management will be in accordance with the rules of the Board of Commerce, and Hankow-Canton and Hankow-Szechuan lines. The Board of Commerce after due consideration of the scheme has warmly commended the exertions of the local men, as Shansi is undoubtedly a rich province and it is too often the custom of wealthy Chinese to neglect their own provinces and spend the money elsewhere. The board questions whether the necessary funds are all in hand, or the requirements of the railway regulations all fulfilled, and calls the attention of those who have means to the special advantages offered by regulations 9 and 12 to those who raise money for public enterprises, in order to stimulate public spirit.

PEKING SYNDICATE'S CONCESSION, CHINA.—The Peking correspondent of *The Times* (London), announces the signature of the agreement, by which the Peking Syndicate sells its railway from Tao-kou to Ching-hua to the Chinese Government payment to be made in 5 per cent bonds to the amount of £700,000 guaranteed by the Chinese Government, and the syndicate to work the line on account of the government. The delay has been due to the obstruction of Sheng, Director of Railways. In this case his unwillingness to sign was due to the fact that China, by the terms of the agreement, which must give the British similar rights to those granted to the Russians in the case of the Cheng-ting-Tai-yuen Railway, is required to guarantee as from January 1st, 1905, interest upon the capital of the railway, which amounts to £35,000. The railway is 91 m. in length, and runs from the mining property of the syndicate in Honan Plain to the small Wei River, crossing half-way the Peking-Hankcw trunk line. The railway at present is, naturally, unable to earn its running expenses, but expects a large increase in its income when the two shafts now being sunk by the syndicate reach coal. These shafts are down 400 ft. The work was begun in September, 1902, and has been much delayed by the unexpected abundance of water. Coal was reached before the end of 1905, and the mine opened out. The syndicate is confident that coal will be found of ample thickness, but owing to the breaking of the boring-rod before reaching coal there is no absolute certainty as regards the depth at which coal will be struck or as to what is the thickness of the seam. Owing to the new coal mines already opened or projected, including the Lin-Cheng-hsien coalfield owned by the Peking-Hankow Railway to supply the country along the line N. of Honan, the main expectation of the syndicate is to sell its coal—which, judging from the coal obtained from native mines in the vicinity, is believed to be of excellent quality and semi-anthracite—in the Yangtsze. To reach this district the coal must be carried 385 m. over the Franco-Belgian trunk line controlled by Director Sheng. This latter railway crosses the Yallow River by a bridge, the largest in China, and the object of much interest to engineers, who predict that a considerable portion of it will disappear in the first flood; whereas, if it stands, the knowledge derived from all previous experience of the scouring powers of the Chinese rivers, especially the Yellow River, must undergo revision. No doubt the Peking Syndicate will obtain a clearly defined written agreement with the Belgians and Sheng guaranteeing the economical and uninterrupted carriage of its coal to the Yangtsze or along the railway to the N. failing which it should carry out its original intention to construct a railway 33 ms. long into Shansi Province, where its most valuable concessions are situated, and build a permanent bridge of its own across the Yellow River and a trunk line of its own from the bridge via Kai-fong to Nanking. Already the syndicate has prior rights to construct this railway, which would be one of the most promising in China.

## ELECTRIC LIGHTING, TRACTION POWER, ETC.

TELEPHONE EXTENSION, JAPAN.—A telephone service has been inaugurated at Atsuta Village, Atsuta-gun, Hokkaido.

ELECTRIC TRAMWAY, PENANG, STRAITS SETTLEMENTS.—The new electric tramway at Penang is drawing near completion. The cars are singledecked, and seats run in rows across the breadth of the cars. They are entered from the side.

TELEFUNKEN APPARATUS.—The Argentine Navy has Telefunken apparatus in use on four warships, namely, *Julio*, *Patria*, *Libertad* and *Independencia*. Messrs. Arnhold, Karberg & Co. are China agents for System Telefunken.

ELECTRIC LIGHTS FOR WUCHANG, CHINA.—Part of a loan of Tls. 1,000,000 which has been secured by the Viceroy at Wuchang from a British firm, for public improvements there, will be expended for the installment of an electric lighting system in the viceregal city.

KUALA LUMPUR, SELANGOR, FEDERATED MALAY STATES.—Eighty thousand dollars has been set aside for the electric light scheme in this city, making up the balance of the $880,000 originally estimated, while $35,000 is allotted to lighting government quarters.

ELECTRICITY FOR CANTON, CHINA.—Albert C. Lee, of Providence, R. I., an electrical engineer, and Y. C. Lee, of New York, a civil engineer, cousins and both natives of China, have arrived at Canton from the United States in compliance with a summons from the viceroy there, to make the preliminary estimates for the installation of a big municipal power and lighting plant, with the probability that a big system of electric railway, under municipal control will follow. The expenditure of millions of dollars to give Canton a modern lighting and power plant will follow the reports of these two authorities, both of whom have been educated in America.

ELECTRICITY IN CHEFOO, CHINA.—The promoters of the Chinese Electric Light Company, Ltd., in Peking, have obtained sanction from the Board of Commerce and the Governor of Shantung for the introduction of electric light into Chinan for the use of both foreigners and Chinese. Tls. 150,000 is to be invested at Chinan by Chinese merchants of Tientsin, Chefoo and Chinan. The company promises to charge in silver currency $1 per lamp of 10 candle-power, $1.60 per lamp of 16 candles and $2.50 per lamp of 25 candles, per mo. It will be managed after the new regulations of the Board of Commerce concerning the establishment of electric light companies in China.

ELECTRIC POWER IN INDIA.—Plans are now being perfected for the generation of electric power on a large scale in the Punjab for transmission to Lahore and Amritsar, the Punjab Power Association of London having been formed for the purpose. The power is to be generated on the Bari Canal and transmitted over a distance of 70 ms. to the first mentioned city and 100 ms. to that named second. Coal at the points of delivery of the power now costs from $5 to $6 per ton, and it is expected that the low price at which electric power will be supplied will give a general interest to industrial undertakings at Lahore and Armitsar. The United Provinces Power Association of London has also been formed to develop hydraulic power on the Jumna River and to transmit electric power to Delhi, 140 ms. distant, and possibly to Simla, 95 ms. distant in the opposite direction.

ELECTRICAL ORDERS, JAPAN.—The General Electric Company of the United States has recently received orders from Japan for electrical machinery, as follows: Fusan Electric Company, two 45-kw, belt-driven direct

current generators. Ashio Copper Mine, one 50-kw, 500-volt, 50-cycle induction motor; one three-phase 60-kw transformer and two switchboard panels. Nagoya Electric Light Company, 21 two-phase induction motors aggregating 210 horse-power; 40 60-cycle transformers aggregating 215 kw. Tokio Shigai Railway, two 25-hp induction motors. Arakawa Mines, two 65-hp induction motors geared to two Deane single-acting 8½ in. x 12 in. pumps, rated to deliver 650 U. S. gallons of water per minute, against 1,010 feet head. Mitsui & Company, Tokio, three 50-kw, three-phase, 3,500-volt., Curtis turbine generators; two 25-kw, 450-volt, direct-current tandem-compound marine generating sets; one 125-kw induction motor and 28 other induction motors aggregating 670 horse-power; six 30-kw transformers; nine three-phase transformers aggregating 225 kw., and a switchboard consisting of nine transformer panels.

## WATERWORKS AND IRRIGATION

Waterworks Installation, Wuchang, China.—This viceregal city of China is to have a modern waterworks system. Money has been loaned to the viceroy by a British firm to carry out the improvement.

Canton (China) Water Supply.—A party of foreign engineers is now at work making a complete survey of the Chinese city of Canton preliminary to the construction of a waterworks system under the direction of the viceroy. The general work of triangulation has been finished and the streets are now being filled in, elevations being taken at frequent intervals. While this work is progressing all possible sources of water supply are being investigated. A pumping station (or stations) at the source (or sources) of supply, with towers in several sections of the city, probably will be the scheme submitted. This is the first proper survey ever made of Canton and one incidental result of it will be that an accurate map of the city will be available.

## BUILDINGS

Residential School, Kuala Kangsar, Pahang, Federated Malay States.—For land and buildings for the Malay Residential School at Kuala Kangsar, the government has appropriated $30,000.

Resident-General's House, Pahang, F. M. S.—For completion of the resident-general's house at Kuala Kangsar, $45,000 will be spent during the current year. For furniture, electric bells and wiring, an additional sum of $16,500 will be expended.

## BRIDGES

Bridging Canton River.—Since the Canton River (China) reclamation has been extended, the river has become narrower and the consequence is that during high tides many ferryboats are upset and lives lost. With a view to securing public safety, a scheme has been submitted to the viceroy by merchants for the construction of a bridge across the river. To save expense it is proposed to construct a wire bridge from the Hoi Chu Fort, and it has been estimated that a sum of Tls. 500,000 will be required to carry out the work.

## PUBLIC WORKS

Public Works, Federated Malay States.—The various works projected for the current year by the Public Works Department of the Federated Malay States will cost in the neighborhood of $2,291,557.

Kuala Lumpur, Selangor, Federated Malay States.—Possible improvements in the capital city of Selangor, Federated Malay States, include votes for the draining and filling in of swamps, the survey of the drainage system, the reconstruction of drains, the purchase of land and construction of back lanes, special reconstruction of roads and streets, and $21,000 for new roads. A new steam roller is also allowed for. Other public works:—"*Waterworks, Kuala Lumpur*"—Private supply, $1,000; extension of branch mains, $25,000; dipper fountains for standpipes, $4,400; extension of intake filters and improvements to pipe line, $7,000; surveys for further extension of service of water supply, $8,000. The Town of Klang gets $18,000 for the extension of its water supply, and provision is made for preliminary surveys to supply Kuala Kubu with water.

## PORT WORKS, DREDGING, DOCKS, ETC.

New Iron Pier, Penang.—Sir John Anderson, Governor of the Straits Settlements, has, it is reported, decided to name the new iron pier at Penang "Swettenham Pier."

Kiangnan Dock, Shanghai.—The new Kiangnan Dock, belonging to the Chinese Government at Shanghai, is now open. The Chinese cruiser *Kiangnan*, Admiral Sah's flagship, was the first vessel to be docked.

Kiangnan Dock, Shanghai.—Among the many improvements under way in Shanghai none exceed in importance, to shipping interests, those recently consummated at Kiangnan Dock. The dock has a river frontage of ¾ m. New, modern and costly machinery has been erected for the repairing and construction of sea craft. The dry dock has a length on top of 395 ft., length on blocks of 375 ft., width of entrance 60 ft., water on sill, spring tides, 19 ft. Two 20-in.pumps and one 10-in. pump have been installed. These pumps have a capacity of pumping the dock dry in 90 mins. There are patent slips for hauling up small craft. In the new machine shop a 40-ton overhead traveling crane has been installed. The heavy machinery in this shop is second to none in Shanghai. The shop large as it is, is fully occupied by the rapidly increasing business of the company, which is now building a steel towboat for a local firm. Three steam launches, for harbor use by the company, have been ordered and are now on their way. Mr. R. B. Mauchan, well-known in Shanghai, is the efficient superintendent of the dock.

Tow of the Drydock *Dewey*.—The Navy Department at Washington has decided to use the supply ship *Glacier* and the colliers *Brutus* and *Cæsar* to tow the big drydock *Dewey*, recently completed by the Maryland Steel Company at Sparrow's Point, Maryland, to Manila, and has ordered from the American Ship Windlass Company, Providence, R. I., three No.5 Shaw & Spiegle towing machines, the same make that was used in the transoceanic towing feats of the Standard Oil Company lately, and which proved so eminently successful. There are now about 150 of these machines in use, and there has never been a case where one has failed to do its duty, and they are the only machines that have ever been thoroughly tested in ocean towing. The action of this machine in avoiding heavy strains on the hawser is simply perfect. Its distinctive feature is that by means of its driving and cushioning steam cylinders there is provided an elastic steam cushion and an automatic relief to the hawser, without which the hawser would be continually straining and frequently breaking. In fact, it is the only known method of towing by which to prevent heavy strains on the hawser. It was expected that *Dewey* would get under way about December 1, and that it would take about 5 mos. for it to reach its destination in the Philippines. The route will be by way of the Suez Canal, a distance of 10,500 miles. There is no question of the wisdom of the Navy Department in deciding on this method of transporting *Dewey*, and it is evidence that it realizes fully the importance of throwing every safeguard around the moving of this gigantic structure on its long voyage, and thus insuring it against going adrift from the vessel towing it in case of storm or heavy seas liable to be encountered on the ocean. That it has chosen the best appliance made for the purpose will be conceded by all who have seen the Shaw & Spiegle machine in action and know what it is capable of doing. This method of towing is now employed by shipping all over the world, and the American Ship Windlass Company, the builders of the Shaw & Spiegle machines, have hundreds of letters testifying to its reliability and perfect service.

## SHIPBUILDING, MARINE, ETC.

Japanese Flagship *Mikasa*.—Salvage operations are progressing satisfactorily on the Japanese flagship *Mikasa*. The authorities are determined to raise her with the least possible delay.

New China Merchants' Steamer.—The latest addition to the already fine fleet of the China Merchants' Company arrived in Hongkong recently. She is Hsinchang, a fine up-to-date passenger and cargo steamer.

Toyo Kisen Kaisha.—This Japanese shipping company has inaugurated its service to South America with the chartered steamer Glenfarg, which sailed from Kobe and Yokohama recently on the first trip in the company's new service.

Measurements of Japanese Cruiser *Tsukuba*.—The new cruiser *Tsukuba*, which was recently launched by the crown prince of Japan, at Kure, is a vessel of 13,750 tons displacement, 440 ft. long, 75 ft. wide, with a draught of 36 ft. She is the largest warship ever built in Japan, and was set on the stocks January 14th, 1905.

North German Lloyd.—A new steamer for the North German Lloyd, named Hessen, and to be employed in the service from Bremen *via* Amsterdam to Java, has made its initial voyage to Java and Australia. It is of the same type as the ss. Franken. The dimension is 124.9 meters length, and the displacement 5,000 gross registered tons, while the engines develop 3,842 h. p., and give a speed of 14¾ ms., with 84 r. p. m.

Chinese Cruiser Raised and Docked.—The Chinese cruiser *Lui Fu*, which was sunk by collision with the Canton River boat *Tai On*, has been raised and docked. As *Tai On* is owned by a Chinese company registered at Hongkong the Chinese Government has lodged a claim for indemnity at the British Consulate, Canton. The foreign surveyors estimate the damage to the cruiser at $4,000, but the Chinese claim $8,000, so the case is still unsettled.

River Navigation, China.—Some prominent Chinese merchants of Liachoufu have obtained permission of the Governor of Shantung to form an inland navigation company for shallow draught steamers and launches over inland rivers. The company's capital is Tls. 150,000 which will be entirely subscribed among wealthy Chinese officials and merchants. The Bureau of Commercial Affairs at Chinan has been instructed by the governor to protect the company and try every means in its power to assist the promoters, so as to make the concern a profitable enterprise.

Motor Launch, Borneo.—Another addition to the Sandakan River fleet is the motor launch recently imported by the Borneo Company, Ltd., for the Kuching River trade, and more especially, for the pepper trade. The new launch, which has been named *Astana*, is a 2-decked twin-screw vessel, flat bottomed, and when fully loaded drawing only 2 ft. of water. She is 70 ft. long and 15 ft. broad, and will carry about 200 passengers or 20 tons of cargo. She was specially built to order by Saunders Patent Launch Building Syndicate, Ltd., Goring-on-Thames.

Another Transpacific Line.—The *Railway and Engineering Review* says that Senator Clark has completed plans for the establishment of a line of steamers to be run from San Pedro to the Orient in connection with the San Pedro, Los Angeles and Salt Lake Railroad. These boats are to touch at the Hawaiian Islands and the ports of China, Japan, and Manila, and are designed to compete with the steamers of the Hill lines, and to supplement the Harriman lines. The United States Government has finished at San Pedro a break-water costing $5,000,000 which makes it a fine harbor, as vessels drawing 35 ft. can enter. The San Pedro line has begun the construction of large docks at its terminal, and the company is chartering tramp steamers to encourage the trade and prepare for the establishment of the new line when the new boats already contracted for are finished. The contracts call for the building of four new 15,000 ton steamers

New Indo-China Steamer.—Messrs. William Dobson & Co. launched at Walker-on-Tyne a steel screw steamer built to the order of the Indo-China Steam Navigation Company, Ltd., for its China coast service. The vessel is of the spar-deck type, with bridge and forecastle, of the following dimensions:—Length between perpendiculars, 265 ft.; breadth, 40 ft.; depth, moulded, 23 ft. She is designed to carry a dead weight of about 2,600 tons on a light draught and steam at a good speed. The propelling machinery, which is being constructed by the North-Eastern Marine Engineering Company, Ltd., of Wallsend, consists of a set of triple-expansion engines, having cylinders 20.33, and 54 in. in diameter, and 39-in. stroke. Steam is supplied by one large single-ended boiler, fitted with forced draught. The vessel was named *Cheong Sing* ("Prosperous Promotion").

Boston SS. Company's New Pacific Liners.—The Boston Steamship Company, which operates the steamers Shawmut and Tremont, will, it is reported, augment its Transpacific line by the addition of two other steamers of about 10,000 tons gross. According to the annual report of the company Shawmut has been a loser in the past year. The Company made a net profit in 1904 of $21,000 against $125,502 for 1903. President Winsor said in his annual report:—"The chief cause of the small profits is that the steamer Shawmut, during a typhoon at Hongkong, was driven ashore in August, 1904. While we collected from the underwriters the cost of repairs we were not able to cover by insurance the loss of service, which in this case was about 3 mos. If we had the carrying capacity of this ship during the time lost by this disaster the net result of the year's business would have been about $50,000 better. We have expended and charged to operating expenses $81,334 for repairs on the ships. They are to-day in excellent condition and well kept up. The cost of the passenger accommodations has proved a wise one and has paid a good return. Your steamers are covered by insurance to the extent of $1,810,000. Owing to the end of the war between Japan and Russia we shall be relieved from the premiums on war risks we have been obliged to carry the past year, which amounted to about $6,500. Another year's operations confirm the opinion previously expressed, that the American merchant marine in foreign trade requires some reasonable encouragement from the government."

## MINES AND MINING

Gold in Japan.—Upon the borders of Hitachi, Iwaki and Shimotsuke, Japan, there is a mountain called Hakko-zan, and it is believed gold may be found there in considerable quantity.

Peking Syndicate.—The seam of coal on which efforts of the Peking Syndicate have been concentrated for some time has been successfully reached, and the syndicate hopes within the next few weeks to bring to the surface coal of a very superior quality, and probably at a lower rate than is now in vogue.

Kerosene Oil Fields, China.—United States Viceconsul Gracey, of Nanking, reports that abundance of kerosene oil has been found in the region of Yenanfu, Province of Shensi, China, covering an area of 100 to 130 ms The quality is reported to be equal to that found in America, and the natives are now using it for lighting purposes. Owing to the lack of refinement this gives off considerable smoke, which could be easily overcome should a refinery be started there. It is hoped by the Chinese gentry that a company may be formed to provide funds for an oil factory.

Chihli (China) Coal-Mining Enterprise.—M. Jadot, chief engineer of the Ching Han Railway, is making a loan of Tls. 930,000 to the Tientsin customs taotai to work the Linchenghsien coal mine in Chihli. The mine will be worked by a Chinese company under Belgian supervision. Fifty per cent of the value of the coal taken out is to be paid as royalty to the Chinese Government, in addition to 1 *mace* for customs duty and 48 *cash* as bonus per ton. After the payment of interest, 10 per cent of the profits will be put to reserve, and the remainder divided between the Belgians and Chinese. The mine is close to the Pie Han trunk line.

Malay States Mining Association.—According to one paper the Malay States Mining Association is in a bad way. The mining community will not subscribe enough to keep it going. To escape from being shut down, the association applied to the government for support by a charge on tin. The government would not hear of this unless the miners agreed. The miners would not listen to the idea. The association then debated how to find the way out. Some members thought that sending the hat round would be preferable to circulating a subscription list. Finally the following resolution was passed:—"That a subscription list be circulated among miners for subscriptions to meet the debts of the association, and that henceforth the subscription be $5 instead of $1 per mo."

Manchuria Rich in Gold.—American news says that Lewis Jerman, who spent 19 yrs. in Manchuria in the service of a Russian fur company, declares that the Amur River region is one of the richest gold sections in the world. He believes that Manchuria's wealth will be developed rapidly, now that the war is over, and that Manchuria is assured of protection from roving bands of Chinese. Jerman is preparing to return to the Orient, where he proposes organizing an expedition for exploiting part of Manchuria for gold. Being familiar with many languages he was enabled to obtain information from numerous foreigners and natives who were prospecting in various parts of Manchuria. He made several trips to Kamschatka, and found Northeast Siberia has many auriferous streams, which he believes will yield handsomely before the explorations of John Rosene's Northeast Siberian Company are completed. In 1889 Jeman crossed the Behring Sea and journeyed up the Yuken to Fort Selkirk on a fur-trading expedition.

## MISCELLANEOUS NOTES

Spinning and Weaving Plant, Peking.—A spinning and weaving factory to provide occupation for the imperial concubines is to be introduced into the palace at Peking.

Bankruptcy Law of Siam.—The mercantile community in Bangkok, both European and Asiatic, has recently petitioned the Siamese Government to frame a bankruptcy law that will give greater protection against fraud but so far nothing has come of it.

Ice Factory, Kuala Lumpur, F. M. S.—Messrs Tiang Hin and Co.'s ice factory on the Ampang-rd, Kuala Lumpur, is in operation. The building contains the complete plant of American manufacture, necessary for the conduct of the business.

Reafforesting Abandoned Mining Areas, Federated Malay States.—Three thousand dollars have been set aside by the Government of the Federated Malay States for the reafforesting of abandoned mining areas in Perak, and $1,500 for the State of Selangor.

Boycott at Singapore.—The Singapore Boycott Committee recently ordered the coolies not to work on the repairs of an American ship at the Acme Docks, under threats of beheading. Thereupon the government ordered the coolies to resume work under pain of deportation if they failed to comply. Work was resumed the next day.

Big Sale of Manganese, Borneo.—The British Borneo Exploration Company, Ltd., has sold at a good profit 30,000 tons of Marudu Bay manganese for forward delivery during next year. This is most satisfactory and an excellent augury for the future. The company has not been very long in existence, but owing to the exertions of its energetic manager—Mr. J. C. Robertson—it has attained a success which bids fair to be continuous.

Census of Siam.—The Government of Siam has just completed a census of that kingdom. The population has been returned at 6,680 000, which is slightly higher than was expected. There are 5,699 Buddhist temples and 354 places devoted to other religions. The total number of houses is given at 1,053,781. There are 2,036 "domestic" elephants, 35,812 horses and ponies, 1,104,751 cattle, and 1,144,478 buffaloes. Under the heading of "vehicles" it is stated that there are 113,920 bullock and buffalo carts, and 293,519 boats. The population of Bangkok has still to be counted.

Tobacco Monopoly, Japan.—The Ministry of Finance in Japan recently issued a pamphlet, with diagrams and photographic reproductions of factories, respecting the tobacco monopoly of Japan. This document tells of the present working of the monopoly and the stages that it has gone through since its establishment. Altogether it shows the monopoly has been a distinct success, and that the profits for the year under consideration were -Y-27,500,000, and that 10 yrs. hence it is computed it will have reached -Y-46,000,000.

Trout Eggs for Philippines.—A recent American mail brought 140,000 trout eggs to the insular government of the Philippines. They come from the Imperial Fisheries Institute of Tokyo, and were put on board in three large cases at Yokohama. They were in charge of Professor T. Higurashi of the Imperial Fisheries Institute, who is caring for them at Manila. The development of the eggs was suspended on the voyage by applying ice, but they have been put into water of the proper temperature and are now hatching. The coming of the trout eggs is the result of efforts made by Commissioner Worcester, who negotiated with the Japanese Government through Huntington Wilson, American chargé d'affaires at Tokyo. When hatched the trout will be placed in the mountain streams of Benguet.

Lead Pencil Wood, Philippine Islands.—The Philippines may soon be a source of supply for the manufacturers of lead pencils in the United States. The supply of cedar is fast running low in the United States and samples of Philippine woods which may be used for this purpose have been requested for experiment by at least one firm of pencil manufacturers. There has been forwarded by the secretary of the interior to J. W. Musgrave, Farmington, Tennessee, the representative of the American Lead Pencil Company and brother of Dr. Musgrave of the Bureau of Science, a sample block of red **calantas**, the colored variety of the wood, which is used for carving purposes to such an extent in these islands. The wood is of spongy substance, is almost without grain and is strong and light. It is entirely without knots. The supply of **calantas** is almost unlimited, and with the introduction of railway system in the islands, which will tap the forests in which it grows, thus affording transportation facilities which will reduce the cost of exportation, it is estimated that competition for the trade of pencil manufacturers will be most profitable, should the specimen sent to the American Lead Pencil Company meet with all the requirements.

Japanese Commerce.—In the report by Special Agent Crist, he deals with the larger problems of Japanese commerce. He says the bulk of the empire's business is done by means of brokers and agents. Sample rooms play a most important part in the importing lines. The study of these will repay merchants and manufacturers seeking an entrance into oriental markets. English and German ways of working up and securing trade in the East are referred to and commented on favorably. In another report Mr. Crist furnishes American merchants and manufacturers with an excellent outline of the work being done in the business world in and about Kobé, a city that Mr. Crist puts at the head of the Japanese empire's importing and exporting centres. Mr. Crist deals in considerable detail with conditions affecting trade in the Kobé district, but common to all parts of the Empire. He points out the possibilities for certain lines, calls attention to the goods that are going in now, and to the kinds that might make their way if judiciously handled. He points to the delays due to incomplete and inadequate landing and handling facilities, citing the fact, however, that large deposits of goods now on the docks were rushed in to get ahead of a new tariff—not an uncommon thing in western countries. Parliament, it is thought, will put up a couple of millions of dollars to remedy this evil.

Far Eastern Petroleum Trade.—A corporation, called the Californian Petroleum Refineries, Ltd., has been formed in London with a capital stock of £200,000. all of the directors with the exception of one being Britons. The scene of the corporation's operations is to be in the United States with a new and independent departure in the methods of conducting the petroleum oil business. A majority of the company's stock is held by San Francisco investors, and the purpose is to erect and operate a refinery for the refining of crude petroleum and making therefrom the usual side products. Its site has not yet been secured, but it will be on the California Coast, and probably within a short distance of San Francisco. The basis of this deal is the property of the Graciosa Oil Company, which has 6,500 acres in Santa Barbara County, California, with four deep wells down and the fifth approaching completion, the production of which is estimated at 10,000 bbls. *per diem*. A pipe-line is to be constructed to Point Sal on the ocean, where a line of vessels will load the Graciosa oil for shipment to the refinery. The formation of the company was effected through the medium of Messrs. Jardine, Matheson & Co., of London, which firm has a large clientele in Eastern Asia, particularly in China and Japan, and has, it is understood, contracted to dispose of the Graciosa petroleum in the Far East after it has left the refinery. This oil is of the high grade of 27° and the company producing it is owned principally by Isaac Leibes and Henry J. Croker and their friends. Under the arrangement made by Isaac Leibes, the Graciosa Oil Company and the Californian Petroleum Refineries Ltd. will be able to act independently in the shipment, refining and marketing of their products, a statement which signifies much to those acquainted with the status of the petroleum industry in California.

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## FINANCIAL NEWS

Perak (F. M. S.) Expenditures, 1906.—Perak's share of federal expenditure for 1906 has been estimated at $4,452,428.

Shanghai Waterworks Company, Ltd.—The capital of this company will be increased to £327,000 by the creation of 9,150 new shares of £20 each.

Federated Malay States Investments.—Interest on investment made by the Government of the Federated Malay States is estimated to bring in an annual revenue of $116,000.

Russo-Chinese Bank.—A branch of the Russo-Chinese Bank has been opened at 41 Threadneedle-st., London. Mr. Chantrey Inchbald, London representative of the bank for 5 yrs., is the manager.

Postal and Telegraph Department, F. M. S.—The revenue of the F. M. S. Postal and Telegraph Department has been put down at $308,000. It is not yet self supporting as the expenditure is estimated at $440,721.

Kansai Railway Bond Loan.—A good deal of interest is being shown in London in the issue of £1,000,000 of 4½ per cent first mortgage debentures of the Kansai Railway Company, Ltd., Osaka, at an issue price of 97½ per cent.

Railway Traffic Estimate, Federated Malay States, 1906.—Four million dollars is the amount of the estimated receipts from passengers and freight traffic on the railways of the Federated Malay States during the current year.

Kwansai Railway.—Some attention has been given in the London market to the probably early issue of debentures of the Kwansai Railway for £1,000,000. The interest will be 4½ per cent, and the market has assumed that issue price will be 97½.

Japan Emigration Company.—It is announced that the Mitsui Bussan Kaisha intends buying up this concern, which was established at Yokohama with a capital of -Y-100,000, and to engage principally in the business of sending emigrants to Mexico. The capital will be increased to -Y-500,000.

Penang (Straits Settlements) Hills Railway.—At a recent extraordinary general meeting of the shareholders of the Penang Hills Railway Company, Ltd., it was decided to voluntarily wind up the affairs of the company, for which purpose Mr. A. F. G. Anderson, Penang, was appointed liquidator.

Japanese Loan.—The new Japanese loan, according to London advices, will be for £50,000,000 at 4 per cent interest, of which £25,000,000 have already been offered at the issue price of 90. Twelve million pounds have been placed in Paris, £6,500,000 in London, £3,250,000 in America, and the same amount in Berlin.

Selangor Estimates, 1906.—It is anticipated that the revenue of this Malay state will amount to $8,479,219, and the expenditure to $7,232,941; thus leaving a balance on the right side of $1,246,278. Land revenue and federal receipts are to be mainly responsible for this state of affairs, the latter item showing an increase of over $300,000.

Investments in Japan.—According to reliable statistics, the amount of foreign capital invested in Japanese industries at the beginning of the war in the N. was only $1,000,000 gold. The Tokyo Electric Light Company and the Hokkaido Colliery and Railway Company have respectively successfully negotiated foreign loans for $1,500,000 and $5,000,000 gold

Manila Railway Company, Ltd.—Sir Mortimer Durand, British ambassador at Washington, D. C., has had an interview with Secretary of State Root, with reference to the claim of the Manila Railway Company, Ltd., for $1,500,000, gold, damages, for the use of the Manila-Dagupan line by the American military authorities during the Spanish-American War, and the subsequent Filipino insurrection.

Duff Development Company, F. M. S.—The shareholders of this corporation have decided to increase the capital stock of the company to £500,000 by the creation of 100,000 additional ordinary shares of £1 each, ranking for dividend and in all other respects pari passu with the existing ordinary shares in the capital of the company. The Duff Development Company possesses what is considered good property in the State of Kelantan.

Selangor (F. M. S.) Estimates, 1906.—The Selangor estimates provide for a revenue of $8,479,219, and an expenditure of $7,232,941; thus leaving a balance on the right side of $1,246,278. Land revenue and federal receipts are mainly answerable for this state of affairs, the latter item showing an increase of over $300,000. A slight decline is anticipated in customs, licenses and municipal receipts. All these various works swell the total expenditure of the Public Works Department to the sum of $2,291,557.

Cathay, Ltd.—Cathay, Ltd., has been registered in London with a capital of £11,000 in 20,000 deferred shares of 1s. each, and 10,000 ordinary shares of £1 each. It is intended to seek and secure openings for the employment of capital in China, Japan, the Far East, and elsewhere; to acquire and deal with lands, buildings, mines, rights, concessions, etc. It is registered without articles of association, and there is to be no initial public issue. The registered office is 9 and 10 King-st, Cheapside, E. C.

Treasury Note Issue, Canton (China) Government.—The issue of treasury notes by the Canton Government has proved to be a profitable business. By order of the viceroy the notes are accepted at all government departments in payment of revenues and taxes. As a negotiable instrument the commercial community has found it to be a commodity of great convenience. The amount of notes at present in circulation is $700,000, and it is estimated that at the end of 1905 the profit derived from this note issue amounted to $100,000.

Negri Sembilan (F. M. S.) Estimates, 1906.—The Negri Sembilan estimates for the current (1906) year have been published. The revenue is placed at $2.281,-179, and the expenditure at $2,812,852, leaving an adverse balance of $531.673. The grand total estimated to be spent on public works throughout the state during the coming year is set down at $1,277,851, or not far from half of the total state expenditure. The amount to be spent on surveys only show an increase of some $4,500. The fact that the expenditure will be considerably in excess of the revenue need not arouse uneasiness for the state has a balance in hand.

Manchu Syndicate, Ltd.—The Manchu Syndicate, Ltd., has been registered in London, having a capital of £20,250 in 20,000 ordinary shares of £1 each and 5,000 deferred shares of 1s. each. The object is stated to be to acquire any concessions, rights, lands, mines, or other property in Eastern Asia or elsewhere, and particularly in Manchuria, China, Japan, and Korea; to develop and turn to account the same; to adopt an agreement with H. Collbran and H. R. Bostwick, and to carry on the business of miners, explorers, financiers, company promoters, bankers, underwriters, concessionaires, contractors, etc. No initial public issue.

Kansai Railway Bond Issue.—In connection with the recent issue of the Kansai Railway Company, it is pointed out that the price places the credit of the Kansai Railway at a higher basis than that of the government, and for an issue having an ample special hypothecation. The issue is, however, distinctlyinteresting, as it is the first under the law which grants foreigners the right to hold mortgages on Japanese railway undertakings. The allotments of debentures have been evidently heavier than applicants desired The price has fallen ¾ @ ½ discount for cash and ½ discount ½ premium for special settlement, whereas the price was 1¾ premium on the day of allotment.

Straits Trading Company, Singapore.—The ner profits of the Straits Trading Company for the half yeat ended September 30th last, amount to $499,877.98, to which has to be added the balance of $84,222.49 brought forward from the last account. At the general meeting recently held at Singapore it was proposed that a dividend of $1 and a bonus of 50 cts. per share be paid on the 250,000 shares of $10 each; that $50,000 be added to the reserve fund, which will then stand at $850,000; that $50,000 be added to the fund for equalizing dividends, bringing it up to $150,000; that $15,000 be transferred to the employee's bonus account, and that the balance of $64,100,47 be carried forward.

Cowie Harbor Coal Company, Ltd.—This company has been registered in London with a capital of £100,000 in £1 shares, to acquire the business of the Sandakan Bay Coalfield, Ltd., including an agreement dated March 4th, 1904, for a concession granted by the British North Borneo Company, in connection with the coalfields in the Surudong District, British North Borneo, and the option to acquire a lease or leases in relation thereto; to adopt an agreement with the liquidator of the above-mentioned company; to examine and explore land in Borneo or elsewhere, and to carry on the business of miners, mining agents, coal owners, metal workers, brick manufacturers, etc. The registered office is 5 Whittington-ave, Leadenhall-st, E. C.

Manila Electric Railroad and Light Company.—The first annual statement of the Manila Electric Railroad and Light Company for the year ended September 1st, 1905, is as follows:—Net earnings, $273,580; interest charges, $123,028; surplus, $150,552 These figures are

in gold. In connection with this report it should be stated that while it is an annual one, the earnings up to April 10th were only for the sale of current for power and lighting purposes, as it was not until that date that the street railway system was opened to the public. There is still considerable work to be done before the railway and lighting system will attain its maximum efficiency, and even up to the present time the full mileage of the railway lines is not in operation.

GOLD STANDARD, CHINA.—The Board of Revenue and the Ministry of Finance of the Peking Government, in deliberating on the scheme for converting China into a gold standard country, recently took into consideration the recommendations made by Professor Jenks on his visit to that country last year, and were half inclined to adopt that gentleman's suggestions and establish a gold currency. Reviewing the question a second time, however, they discovered that the first thing required was gold bullion of which there was only a small quantity at present in China, and that, if foreign money were borrowed for the purpose, it would be only another source of letting money out of the country. After a long and full discussion, it was finally decided to abandon the scheme for the present.—*Nananfupao.*

FEDERATED MALAY STATES BUDGET, 1906.—The Federated Malay States' estimates for 1906 show a revenue of $5,161,890 as against an expenditure of $8,453,463, or a deficit of $3,291,573—a loss which is accounted for by the fact that whereas the federal expenditure is incurred in numerous branches of the public services, the sources of its revenue are few. The receipts of the Postal and Railway Departments are expected to show considerable increase, since, with no income tax, the earning capacity of these two important branches of the service is perhaps the surest test as to whether the country is generally prosperous, or the reverse. The total estimated federal revenue shows an advance of $263,382 on the figures anticipated for this year. In the Mines Department, the absence of any further vote for the sinking of the deep shaft at Raub causes a considerable reduction on this year's figures. $15,000 is, however, to be spent on the purchase of boring tools.

MILITARY EXPENDITURE.— The war office establishment of four new divisions -Y-10,000,000; expenditure of troops in Korea and Manchuria, -Y-20,000,000; repairs, -Y-25,000,000.

The navy office increase of military expenditure, -Y-7,340,000; expenditure on Port Arthur Naval station, -Y-2,200,000; repairs, -Y-22,000,000; colliery works, -Y-160,000, Total, -Y-86,700,000.

EXPENSES FOR ENTERPRISES IN MANCHURIA.—The expenses for enterprises in Manchuria are not included in the budget. The government believes, however, that it will be able to obtain at least -Y-50,000,000 from Russia to reimburse the expense of maintaining the prisoners of war, and intends to divert the sum to Manchuria.

EXPENSES FOR RESIDENT GENERAL OFFICE AND EMBASSIES.—The expenses required for the establishment of Resident-general office in Korea are estimated at -Y-1,180,000 and those for embassies at -Y-390,000.

LOANS FOR FISCAL YEAR.—The government has to raise over -Y- 316,500,000 by issuing domestic loans this year. In order to effect the issue, the government will redeem the outstanding domestic loans of a higher rate of interest, by using -Y-250,000,000 of the foreign loan just issued, and take advantage of the slackening of the money market, due to this redemption, to issue the proposed domestic loans.

## COMMERCIAL VALUE OF THE COCOANUT IS ENHANCED BY SCIENTIFIC CULTURE OF THE PALM

*(Concluded from page 219)*

interior. After lying for 1 mo. the nuts were put through the regular process for making copra. The weight in pounds of the whole nut, husks, meat and shells, dried shells, and copra was determined directly on an ordinary Fairbanks scale, the meat and milk being obtained by difference. Five hundred nuts from each lot were sun dried and 500 grill dried and the resulting weight of copra multiplied by two to give the yield of 1,000 nuts by each method. For the determination of moisture and oil in this copra, twenty samples were taken from each lot, cut into small pieces, and quartered down to about 100 grams. Following are the most important results of this analysis:—

SERIES XII.—*Seashore Nuts*—Sun dried: Copra 302.1 kilos, 12,8 per cent; oil 182.2 kilos, 7.7 per cent. Grill dried: Copra 330.2 kilos, 14.0 per cent; oil 198.9 kilos, oil 8.4 per cent, *Inland Nuts*—Sundried: Copra 322.9 kilos, 14.1 per cent. Grill dried: Copra 333.0 kilos, 14.6 per cent; oil 189.8 kilos, 8.3 per cent.

This work, performed as it was on a large scale, agrees rather more closely with the results obtained from the series of ten nuts each than was to be expected. Given perfectly sound cocoanuts, the two methods of drying should produce equal amounts of copra, and the figures obtained in this last series on a commercial basis establish, even more firmly than do the results of the analyses alone, the fact that there is practically no difference in quality between the nuts gathered along the seashore and those from farther inland. They should also be of some value as representing the average yieid in copra and oil from nuts produced in the southern parts of the Philippine Archipelago.

# FAR EASTERN SHARE QUOTATIONS

COURTESY OF BENJAMIN, KELLY & POTTS, SHAREBROKERS, HONGKONG, January, 1906.

| STOCK | WHEN ESTAB-LISHED | CAPITAL | NO. OF SHARES | VALUE | PAID UP | RESERVE | AT WORKING ACCOUNT | DATE | LAST DIVIDEND | WHEN PAID | Approximate Return at Present Quotation* PER CENT | CLOSING QUOTATIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Banks.** | | | | | | | | | | | | |
| Hongkong and Shanghai Banking Corporation | 1865 | $10,000,000 | 80,000 | $125 | $125 | *g* £1,000,000<br>*s* $8,500,000<br>*i* $250,000 | ... $1,702,728 | 30-6-05 | £1.15/- at exchange 1/10½=$18.66.67 for first half-year 1905 | 21-8-05 | 5 | $895<br>London £93 |
| National Bank of China, Limited | 1891 | £699,475 | 99,925 | £7 | £5 | $200,000 | .....$41,768 | 31-12-04 | $2 (London 3/6) for 1903 | 1-2-04 | — | $38 buyers |
| **Marine Insurances.** | | | | | | | | | | | | |
| Canton Insurance Office, Limited | 1881 | $2,500,000 | 10,000 | $250 | $50 | $1,600,000<br>*j* $147,895 | ..... $211,540 | 31-12-04 | $20 for 1904 | 21-10-05 | 6½ | $315 sellers |
| China Trader's Insurance Co., Ld. | 1865 | $2,000,000 | 24,000 | $83.33 | $25 | $950,000<br>*f* $169,215<br>*j* $202,455<br>*u* $296,955 | ..... Nil. | 30-4-05 | $4½ for year ended 30-4-1905 | 18-12-05 | 5 | $90 buyers |
| North China Insurance Co., Ld. | 1863 | £150,000 | 10,000 | £15 | £5 | *g* £100,000<br>*s* Tls. 100,000<br>*f* Tls. 50,000 | ...Tls. 302,053 | 30-6-05 | Final of 7/6 making 15/- for 1904 | 25-10-05 | 5½ | Tls. 95 |
| Union Insurance Society of Canton, Limited | 1867 | $2,500,000 | 10,000 | $250 | $100 | *s* $2,000,000<br>*g* £40,000<br>*f* $331,453<br>*j* $1,043,930<br>*u* $1,152,346 | .....$2,339,112 | 30-6-05 | $40 for 1904 | 20-10-05 | 5½ | $720 buyers |
| Yangtsze Insurance Association, Ld. | 1862 | $800,000 | 8,000 | $100 | $60 | $750,000<br>*i* $50,000<br>*j* $5,890 | ..... $599,364 | 31-12-05 | $12 and $3 special dividend for 1903 | 12-4-05 | 8½ | $170 |
| **Fire Insurances.** | | | | | | | | | | | | |
| China Fire Insurance Co., Ld. | 1870 | $2,000,000 | 20,000 | $100 | $20 | $1,000,000<br>*x* $218,039<br>*f* $2,241 | ..... $260,374 | 31-12-04 | $6 dividend and $1 bonus for 1903 | 10-3-05 | 8 | $90 buyers |
| Hongkong Fire Insurance Co., Ld. | 1868 | $2,000,000 | 8,000 | $250 | $50 | $1,200,505 | ..... $360,372 | 31-12-04 | $34 for 1903 | 7-3-05 | 11 | $330 |
| **Shipping.** | | | | | | | | | | | | |
| China and Manila Steamship Co., Ld. | 1882 | $750,000 | (*1*) 30,000 | $25 | $25 | $5,000 | $8,832 | 31-12-04 | $1 for 1904 | 27-3-05 | 5 | $20 sales |
| Douglas Steamship Co., Ld. | 1883 | $1,000,000 | 20,000 | $50 | $50 | $261,638<br>*i* $88,941 | ..... Nil. | 30-6-05 | $3½ for year ended 30-6-1905 | 25-9-05 | 9½ | $36½ buyers |
| Hongkong, Canton and Macao Steamboat Company, Ld. | 1865 | $1,200,000 | 80,000 | $15 | $15 | *e* $250,000<br>*d i* $600,000<br>*f* $145,376 | ..... $8,064 | 30-6-05 | $1 for first half-year 1905 | 16-8-05 | 8 | $25½ buyers |
| Indo-China Steam Navigation Company, Ld. | 1882 | £1,200,000 | (*2*) 60,000 | £10 | £10 | £120,000<br>*i* £241,150<br>*h* £3,999 | ..... £4,435 | 31-12-04 | 12/- @ 1/10 7/8=$6.29.51 for 1904 | 13-7-05 | 7 | $92 |
| Shanghai Tug and Lighter Co., Ld. | 1903 | Tls.1,500,000 | 200,000 | Tls. 50 | Tls. 50 | *i* Tls. 25,000 | ... Tls. 43,762 | 31-12-04 | Interim of Tls. 2. for 1905 | 28-8-05 | 8 | Tls. 55 buyers |
| Do. Preference | | | 100,000 | | | | | | Interim of Tls. 1¾ for 1905 | | 8 | Tls. 47 buyers |
| "Shell" Transport & Trading Co., Ld. | 1898 | £2,000,000 | 2,000,000 | £1 | £1 | £400,000<br>*i* £4,144 | ..... £7,815 | 31-12-04 | 1/- (Coupon No. 6) for 1905 | 1-1-06 | 4½ | 22/6 ex div. |
| "Star" Ferry Co., Ld | 1898<br>1900 | $200,000 | 10,000<br>10,000 | $10<br>$10 | $10<br>$5 | $65,000<br>*i* $24,257 | ..... $929 | 30-4-05 | $1.80<br>90 cents for year ended 30-4-1905 | 29-5-05 | 5¾<br>4 | $32 sellers<br>$23 sellers |
| Straits Steamship Co., Ld. | 1890 | $500,000 | (*3*) 5,000 | $100 | $100 | $400,000<br>*e* $21,075<br>*i* $130,153 | .... $21,231 | 31-12-04 | $10 for 1904 | 21-3-05 | 7 | $149 buyers |
| Taku Tug & Lighter Co., Ld. | — | T.T 1,500,000 | 30,000 | T.Tls.50 | T. Tls.50 | Tls. 98,000<br>*d* Tls.195,479<br>*e* Tls. 28,000<br>*i* Tls. 81,200 | ... Tls. 4,333 | 31-12-04 | Interim of Tls. 2 for 1905 | 27-7-05 | 9¼ | Tls. 35 buyers |
| **Refineries** | | | | | | | | | | | | |
| China Sugar Refining Company, Ld. | 1878 | $2,000,000 | 20,000 | $100 | $100 | *e* $450,000<br>*r* $150,000 | ..... $42,812 | 31-12-04 | Interim of $10 for 1905 | 18-8-05 | 10 | $205 |
| Luzon Sugar Refining Company, Ld. | 1882 | $700,000 | 7,000 | $100 | $100 | none | *Dr.* $85,987 | 31-12-04 | $3 for 1897 | 24-3-98 | — | $25 sales |
| Perak Sugar Cultivation Co., Ld. | — | Tls. 350,000 | 7,000 | Tls. 50 | Tls. 50 | Tls. 100,000 | ... Tls. 3,723 | 31-7-05 | Tls. 2½ for year ending 30-9-1904 | 17-12-04 | — | Tls. 62 sales |
| **Mining.** | | | | | | | | | | | | |
| Chinese Engineering & Mining Co., Ld. | 1901 | £1,000,000 | 1,000,000 | £1 | £1 | *d* £80,000<br>*h* £12,289 | ..... £13,355 | 28-2-05 | Final of 1/- (No. 5) | 2-11-05 | — | Tls. 9 sales |
| Oriental Consolidated Mining Co., Ld. | 1901 | G.$5,000,000 | *y* 500,000 | G. $10 | G. $10 | none | G. $672,093 | 31-12-04 | 50 cts. final mak. G. $1 for '05 (No. 5) | 21-12-05 | — | G. $16½ |
| Raub Australian Gold Mining Co., Ld. | 1892 | £200,000 | 150,000<br>50,000 | £1<br>£1 | 18/10<br>£1 | £4,873 | *Dr.* £8,745 | 31-3-05 | No. 12 of 1/-=48 cents | 28-1-01 | — | $4½ |

| STOCK | WHEN ESTAB-LISHED | CAPITAL | NO. OF SHARES | VALUE | PAID UP | RESERVE | AT WORKING ACCOUNT | DATE | LAST DIVIDEND | WHEN PAID | Approximate Return at Present Quotation* | CLOSING QUOTATIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | PER CENT | |
| **Docks, Wharves and Godowns.** | | | | | | | | | | | | |
| Farnham (S. C.), Boyd & Co., Ld ..... | 1901 | T5,520,000 | 55,200 | T100 | T100 | T1,000,000 | .....T34,924 | 30-4-05 | Final of T8 making T13 for 1904/05 | 24-6-05 | 10½ | T124 sellers |
| Fenwick (Geo.), & Company, Ld..... | 1889<br>1905 | $450,000 | 6,000<br>*z* 12,000 | $25 | $25 | $70,000 | ..... $8,577 | 31-12-04 | $3¾ for 1904, on 6,000 shares....<br>First year..... | 13-3-05<br>— | —<br>— | $25 buyers<br>$24½ buyers |
| Hongkong and Kowloon Wharf and Godown Co., Ld..... | 1886 | $2,000,000 | 40,000 | $50 | $50 | $250 000<br>*d.r.* $58,423<br>*i* $10,000<br>*p* $300,000 | .....$29,422 | 31-12-04 | Interim of $2½ for 1905..... | 26-7-05 | 4¾ | $108 buyers |
| Hongkong & Whampoa Dock Co., Ld. | 1901 | $2,500,000 | 50,000 | $50 | $50 | *i* $41,500 | .....$501,332 | 30 6-05 | $6 for first half year '05 ..... | 22-8-05 | 8 | $164 |
| New Amoy Dock Co., Ld..... | 1892 | $67,500 | 10,000 | $6¾ | $6¾ | $55,500 | *Dr*....$10,260 | 31-12-04 | $1¼ for 1903..... | 5-5-04 | 7 | $17 |
| Shanghai and Hongkew Wharf Co. Lt. | 1902 | T3,200,000 | 32,000 | T100 | T100 | *b* T487,210<br>*r* T59,880 | .....T10,711 | 31-12-04 | Interim of T6 for 1905..... | 23-8-05 | 5¾ | T225 buyers |
| Yangtsze Wharf and Godown Co., Ld.. | 1902 | T250,000 | 2,500 | T100 | T100 | T17,500 | .....T2,762 | 31-12-04 | T18 for 1904..... | 29-3-05 | 9¼ | T190 buyers |
| **Lands, Hotels and Buildings.** | | | | | | | | | | | | |
| Astor House Hotel Co., Ld..... | 1901 | $750,000 | (*4*) 30,000 | $25 | $25 | $14,156 | .....$9,028 | 30-6-05 | $2½ for year ending 30-6-1905 ..... | 19-8-05 | 9 | $28 sales |
| Astor House Hotel, Ld. (Tientsin) ..... | — | T. T100,000 | 2,000 | T. T50 | T. T50 | T34,000<br>*e* T8,000 | ..... T806 | 29-2-05 | Interim of T5..... ..... | 21-10-05 | 8 | T130 buyers |
| Central Stores, Ld..... | — | $91,845 | 6,000 | $15 | $12 | $20,000 | .....$1,502 | 31-12-04 | Final of 60 cents making $1.80 for '04...<br>None..... ..... | 30-3-05<br>— | 12<br>— | $15<br>$100 |
| Do. (Founders')..... | | | 123 | $15 | $12 | | | | Preferential of 7% for '04..... | 30-3-05 | 7 | $7½ sales |
| Do. (New Issue)..... | 1904 | $360,000 | 24,000 | $15 | $7½ | | | | | | | |
| Hongkong Hotel Co., Ld. ..... | 1866 | $600,000 | 12,000 | $50 | $50 | $648,975<br>*r* $31,087 | .....$10,126 | 30-6-05 | $5 for first half-year 1905..... | 4-9-05 | 6¾ | $150 sales |
| Hongkong Land Investment and Agency Co., Ld. ..... | 1889 | $5,000,000 | 50,000 | $100 | $100 | *e* $250,000 | .....$37,875 | 31-12-04 | Interim of $3½ for 1905..... | 27-7-05 | 5½ | $125 sales |
| Hotel des Colonies Co., Ld. (Shanghai) | 1902 | T225,000 | 9,000 | T25 | T25 | *n* T20,986 | ..... T7,202 | 31-3-05 | Interim of T1..... | 1-11-05 | 15 | T16 sellers |
| Hotel Metropole Company, Limited .... | 1904 | $200,000 | 2,000 | $100 | $100 | none | .....$4,699 | 30-6-05 | Final of $6 making $10 for the year. | 26-7-05 | 9¾ | $102½ |
| Humphreys' Estate & Finance Co., Ld. | 1887 | $1,500,000 | 150,000 | $10 | $10 | *i* $200,994<br>*e* $50,000 | .....$11,958 | 31-12-04 | 90 cents for 1904..... | 11-2-05 | 7 | $13 |
| Kowloon Land and Building Co., Ld. .. | 1889 | $300,000 | 6,000 | $50 | $30 | none | ..... $377 | 31-12-04 | $3 for 1904..... | 31-1-05 | 7½ | $41 |
| Shanghai Land Investment Co., Ld..... | 1901 | T2,600,000 | 52,000 | T50 | T50 | T828,813<br>*e* T170,000 | .....T40,066 | 31-12-04 | Interim of T3 for 1905..... | 21-7-05 | 6¾ | T120 sellers |
| Tientsin Hotel des Colonies, Ld. ..... | 1903 | T70,000 | 1,400 | T50 | T50 | none | ..... T670 | 31-12-04 | Interim of T3 for 1905..... .... | 4-7-05 | 12 | T45 sellers |
| Tientsin Land Investment Co., Ld..... | 1902 | T772,600 | 7,726 | T100 | T100 | *i* T67,300 | ..... T725 | 31-12-04 | Interim of T3 for 1905..... | 2-8-05 | 6 | T115 sellers |
| West Point Building Co., Ld. ..... | 1889 | $625,000 | 12,500 | $50 | $50 | none | .....$1,247 | 31-12-04 | Interim of $1¾ for 1905..... | 27-7-05 | 6¾ | $55 sales |
| **Cotton Mills.** | | | | | | | | | | | | |
| Ewo Cotton Spinning and Weaving Co., Ld. .. ..... | 1895 | T1,000,000 | (*5*) 20,000 | T50 | T50 | T45,939 | .....T100,000 | 31-10-05 | T8 for year ended 31-10-1904..... | 18-12-05 | 18¼ | T44 sellers |
| Hongkong Cotton Spinning, Weaving and Dyeing Co., Ld..... | 1901 | $1,250,000 | 125,000 | $10 | $10 | *e* $30,000 | .....$23,264 | 31-7-05 | $1 for year ended 31-7-1905..... | 4-9-05 | 7¾ | $13 |
| International Cotton Manufacturing Co., Ld. ..... | 1895 | T750,000 | (*6*) 10,000 | T75 | T75 | T100,000 | .....T18,718 | 30-9-05 | Interim of 3% a/c 1898..... | 30-4-98 | — | T40 buyers |
| Laou-kung-mow Cotton Spinning & Weaving Co., Ld. ..... | 1895 | T800,000 | (*7*) 8,000 | T100 | T100 | none | .....T10,000 | 31-12-04 | Interim of 4% a/c 1898 on 6,000 shares | 1-8-98 | — | T54 sellers |
| Soey Chee Cotton Spinning Co., Ld..... | 1895 | T1,000,000 | 2,000 | T500 | T500 | *l* T5,658 | .....T22,051 | 31-12-04 | 4 % for 1897..... | 2-2-88 | — | T250 buyers |
| **Miscellaneous.** | | | | | | | | | | | | |
| Anglo German Brewing Co., Ltd. ..... | 1904 | $100,000 | 4,000 | $100 | $100 | none | .....$20 | 31-12-04 | None..... | — | — | $100 |
| Bell's Asbestos Eastern Agency, Ld..... | 1895 | £5,377.10*s* | 8,604 | 12/6 | 12/6 | £314 | ..... £ 770 | 31-12-04 | 1*s*. 3d per share for 1904..... | 21-7-05 | 9 | $7¼ sales |
| Campbell, Moore & Co., Ld..... | 1886 | $12,000 | 1,200 | $10 | $10 | $8,000 | .....$1,182 | 31-12-04 | $3 for 1904 ..... | 1-4-05 | 8¼ | $36 |
| China-Borneo Co., Ld..... | 1903 | $720,000 | (*8*) 60,000 | $12 | $12 | none | — | 31-12-04 | $1 for 1904 ..... | 17-3-05 | 10 | $10 sellers |
| China Flour Mill Co., Ld. ..... ..... | — | T200,000 | 4,000 | T50 | T50 | T30,000 | .....T718 | 31-12-04 | Interim of T5 for 1905 ..... | 24-7-05 | — | T80 sellers |
| China Light and Power Co., Ld. ..... | 1901 | $500,000 | 50,000 | $10 | $10 | none | .....$3,739 | 29-2-04 | None ..... | — | — | $10 |
| China Provident Loan and Mortgage Co., Ld. ..... | 1898 | *a* $1,000,000 | 100,000 | $10 | $10 | $80,000 | .....$1,581 | 31-12-04 | 80 cents for 1904 ..... ..... | 18-1-05 | 9 | $9 |
| Dairy Farm Company, Ld..... | 1896 | $187,500 | 25,000 | $7½ | $6 | $25,000 | .....$2,864 | 31-7-05 | $1.20 for year ending 31-7-1905 ..... | 24-11-05 | 7¾ | $15½ buyers |

| STOCK | WHEN ESTABLISHED | CAPITAL | NO. OF SHARES | VALUE | PAID UP | RESERVE | AT WORKING ACCOUNT | DATE | LAST DIVIDEND | WHEN PAID | Approximate Return at Present Quotation* PER CENT | CLOSING QUOTATIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Miscellaneous.**—Continued | | | | | | | | | | | | |
| Green Island Cement Co., Ld | 1889 | $1,500,000 | 150,000 | $10 | $10 | *p* $400,000 / $500,000 | .....$95,054 | 31-12-04 | $2 for 1904 | 27-2-05 | 7 | $28½ |
| Hall & Holtz, Ld. | — | $420,000 | 21,000 | $20 | $20 | $186,000 | .....$7,551 | 29-2-05 | Final of $1½ making $2½ | 15-4-05 | 10 | $25½ sales |
| Hongkong Electric Co., Ld. | 1889 / 1899 | $600,000 | 30,000 / 30,000 | $10 / $10 | $10 / $10 | none | .....$2,151 | 30-4-05 | $1.00 / 50 cents for year ending 30-4-05 | 17-7-05 | 6¾ / — | $15 buyers / $14½ buyers |
| Hongkong High-Level Tramways Co., Ld. | 1887 | $125,000 | 1,250 | $100 | $100 | $50,000 | .....$2,796 | 30-11-04 | $15 for year ending 30-11-04 | 24-12-04 | 7 | $225 |
| Hongkong Ice Company, Ld. | 1881 | $125,000 | 5,000 | $25 | $25 | *k* $60,000 | .....$5,356 | 31-12-04 | Interim of $4 for 1905 | 2-8-05 | 7 | $235 |
| H'kong Rope Manufacturing Co., Ld. | 1883 | $500,000 | 10,000 | $50 | $50 | $60,000 | .....$11,137 | 31-12-04 | $10 for 1904 | 10-4-05 | 7 | $152 buyers |
| Hongkong Steam Waterboat Co., Ld. | 1900 | $150,000 | 15,000 | $10 | $10 | $2,500 | ..... $88 | 30-9-05 | Final of 50 cents making $1 for year ended 30-9-1905 | 24-11-05 | 7¾ | $13 sellers |
| Lane, Crawford & Co., Ld. (Shanghai) | 1903 | $250,000 | 2,500 | $100 | $100 | none | .....$42,009 | 29-2-05 | Interim of $5 | 20-11-05 | 9½ | $145 |
| Maatschappij tot Mijn-, Bosch-en Landbouwexploitatie in Langkat | 1902 | Gs.2,500,000 | 25,000 | G.100 | G.100 | *i* T528,210 / T19,465 | .....T35,849 | 31-10-04 | 4th quarterly dividend of T7½ making in all T22½ for '05 | 15-12-05 | 10¾ | T210 buyers |
| Mondon, (E. L.) Ld. | 1902 | T350,000 | 7,000 | T50 | T50 | none | *Dr.* T117,638 | 31-12-04 | T5 for 1902 | 2-5-03 | — | T25 sellers |
| Philippine Company, Ld. | 1904 | $675 000 | 67,500 | $10 | $10 | none | *Dr.* P53,619 | 31-12-04 | None | — | — | $5 buyers |
| Shanghai and Hongkong Dyeing and Cleaning Co., Ld. | 1903 | $60,000 | 1,200 | $50 | $50 | none | *Dr.* $16,455 | 31-8-05 | None | — | — | $50 |
| Shanghai Gas Co., Ld. | 1903 | T800,000 | 16,000 | T50 | T50 | *d* T145,000 / T108,172 | ..... T8,011 | 31-12-04 | Interim of T3½ for 1905 | 26-7-05 | 7 | T128 buyers |
| Shanghai Horse Bazaar Co., Ld. | 1904 | T270,000 | 5,400 | T50 | T50 | T45,000 | ..... T9,751 | 31-12-04 | T6 for 1904 | 17-3-05 | 9 | T67½ |
| Shanghai Pulp and Paper Co., Ld. | — | T450,000 | 4,500 | T100 | T100 | T25,000 | ..... T6,968 | 31-12-04 | Interim of T6 for 1905 | 22-7-05 | 9 | T150 sellers |
| Shanghai Sumatra Tobacco Co., Ld. | 1902 | T600,000 | (9) 30,000 | T20 | T20 | *w* T24,820 / T25,000 | .....T1,297 | 31-10-04 | Interim of T2 | 20-10-05 | 14 | T65 sellers |
| Shanghai Waterworks Co., Ld. | 1881 | £144,000 | 7,200 | £20 | £20 | T170,000 | ..... T17,220 | 31-12-04 | Interim of 15/- for 1905 | 27-7-05 | 4½ | T450 buyers |
| South China Morning Post, Ld. | 1903 | $150,000 | 6,000 | $25 | $25 | none | *Dr.* $5,068 | 29-2-05 | None | — | — | $20 |
| Steam Laundry Co., Ld. | 1902 | $100,000 | 20,000 | $5 | $5 | none | .....$1,134 | 31-5-05 | 50 cents for year ended 31-5-05 | 20-11-05 | 7 | $7 |
| Straits Ice Company, Ld. | 1884 | $200,000 | 2,000 | $100 | $100 | $25,000 | ..... $700 | 31-12-04 | $5 account 1905 | ...-2-05 | — | $160 buyers |
| Tientsin Waterworks Co., Ld. | 1901 | T. T200,000 | 2,000 | T. T100 | T. T100 | *e* T15,259 / T4,000 | .....T1,012 | 30-4-05 | Final of T4½ making T8½ for '04/5 | 17-6-05 | 7½ | T. T115 buyers |
| United Asbestos Oriental Agency, Ld. | 1896 | $100,000 | 9,900 | $10 | $4 | $22,000 | ..... $551 | 31-5-05 | 80 cents / $19.80 for year ended 31-5-05 | 29-7-05 | 9 | $9 |
| Do. do (Founders') | | | 100 | $10 | $10 | | | | | | 11 | $180 |
| Watson (A. S.) & Co, Ld. | 1886 | $900,000 | 90,000 | $10 | $10 | $300,000 / $25,000 | ..... $6,096 | 31-12-04 | Final of 50 cents making $1 for '04 | 29-5-05 | 7¾ | $13 sales |
| William Powell, Ld. | 1901 | $150,000 | 15,000 | $10 | $10 | *e* $4,500 | .....$676 | 30-6-05 | Interim of 50 cents for 1905 | 25-11-05 | 11 | $10½ buyers |

| LOANS AND DEBENTURES | AGENTS FOR THE LOAN | AMOUNT OF LOAN | PAR VALUE | OUT-STAND'G BONDS | WHEN PAYABLE | CLOSING QUOTATIONS |
|---|---|---|---|---|---|---|
| China Government, 7 per cent. Silver Loan 1886 E. | Hongkong & Shanghai Bkg. Cor. | T767,200 | T250 | 1969 | Mar. 31st & Sept. 30th each year until Mar. 31st, 1917. | par. |
| Hongkong Hotel Co., Ltd., 6% Mortgage Debentures of 1899‡ | | $500,000 | $500 | ⅔ all | Half yearly, June 30th and December 31st | par. |
| Shanghai & Hongkew Wharf Company, Ltd. 6% Debentures of 1902 | | T543,900 | T100 | ..... | Half yearly, June 30th and December 31st | T97 |
| Astor House Hotel Co., Ltd. 8% Debentures of 1903 | | T500,000 | T100 | ..... | Half yearly, January 1st and July 1st | T10⅔ |
| Chinese Engineering & Mining Co., Ltd., 6% Debentures of 1903† | | £500,000 | ¶ | £431,960 | Half yearly, June 30th and December 31st | par. |
| International Cotton Manufacturing Co., Ltd. 6% Debentures of 1901 | Russo Chin. Bk. | T500,000 | T100 | ..... | Half yearly, March 31st and September 30th | par. |

Plus accrued interest

*a* Authorized capital $2,000,000
*b* Building Reserve Account.
*c* Capital Reserve Fund.
*d* Depreciation Fund.
*e* Equalization of Dividend Fund.
*f* Exchange and Investment Fluctuation Account.
*g* Gold Reserve Fund
*h* Exchange Reserve Account.
*i* Insurance Fund.
*j* Reinsurance Fund.
*k* Contingencies Account.
*l* Legal Reserve Fund.
*m*
*n* Sinking Fund.
*o*
*p* Premium on New Issue.
*q*
*r* Repairs and Renewals Account.
*s* Silver Reserve Fund.
*t*
*u* Underwriting Suspense Account.
*v*
*w* Special Works Fund.
*x* Extra Reserve Fund.
*y* 75,000 owned by the Company.
*z* 6,000 shares unissued.
*1* 5,725 shares unissued.
*2* First issue of 60,000 of which 10,411 unallotted.
*3* 785 shares unissued.
*4* 7,600 shares unissued.
*5* 5,000 shares unallotted.
*6* 1,616 shares unallotted.
*7* 842 shares unissued.
*8* 14,000 shares unissued.
*9* 17,000 shares unissued.
* Based on last year's dividend.
‖ Only Tls. 134,000 taken up.
⅔ 268 held by the Company.
¶ In certificates of £20 and £100
‡ Redeemable in 10 years, or at option of Company the Company giving 6 months' notice.
† Redeemable at par at rate of £10,000 per annum from 31st December, 1903, to 31st December, 1952
*Dr.* Deficit.

# SINGAPORE SHARE QUOTATIONS.

COURTESY MESSRS. FRASER & CO., BROKERS, SINGAPORE, JANUARY, 1906.

| NAME | DATE OF FORMATION | CAPITAL | CAPITAL PAID UP | NO. OF SHARES | ISSUE VALUE | PAID UP | RESERVE | LAST DIVIDEND | SINCE LAST MAIL HIGHEST | SINCE LAST MAIL LOWEST | CLOSING QUOTATIONS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | $ | $ | $ |
| **Mining.** | | | | | | | | | | | |
| Bersawah Gold Mining Co., Ld. | 1900 | $175,000 | 115,000 | 13,500 *1* | 10 | 10 | ..... | ..... | ..... | ..... | 15.00 sales |
| " " " " " *Deferred.* | | | | 4,000 | 10 | 10 | ..... | ..... | ..... | ..... | 8.00 sellers |
| Bruseh Hydraulic Tin Mining Co., Ld. | 1901 | $600,000 | 600,000 | 60,000 | 10 | 10 | ..... | ..... | 10.00 | 9.25 | 9.25 sellers |
| Kadana Gold Mining Co., Ld. | 1901 | $300,000 | 300,000 | 20,000 | 10 | 10 | ..... | ..... | ..... | ..... | 2.00 sellers |
| " " " " " *Pref.* | | | | 10,000 | 10 | 10 | ..... | ..... | ..... | ..... | 10.00 nominal |
| Kechau Goldfields, Ld. *Fully paid* | 1902 | £30,000 | 16,175.7/- | 6,207 | 1 | 1 | ..... | ..... | ..... | ..... | 3.00 sellers |
| " " " *Contrib.* | | | | 23,793 *2* | 1 | 19/- | ..... | ..... | ..... | ..... | 2.00 sellers |
| Kuantan Tin Mining Co., Ltd. | 1905 | $150,000 | 99,000 | 15,000 *22* | 10 | 10 | ..... | ..... | 11.00 | 10.00 | 11.00 sales |
| Pahang Corporation, Ld. | 1889 | £250,000 | 244,306 | 244,306 | 1 | 1 | 20,000 | 3 per cent for year ending 30 6-02 | ..... | ..... | 2.00 sellers |
| Pahang Kabang, Ld. | 1890 | £375,000 | 375,000 | 360,000 | 1 | 1 | ..... | ..... | ..... | ..... | 0.25 sellers |
| " " " *Pref.* | | | | 15,000 | 1 | 1 | ..... | ..... | ..... | ..... | ..... nom. |
| Queensland Raub G. M. Co., Ld. *Fully paid* | 1901 | £146,700 | 100,866 | 36,700 | 1 | 1 | ..... | ..... | ..... | ..... | ..... nom. |
| " " " " *Contrib.* .. | | | | 110,000 | 1 | 11/8 | ..... | ..... | ..... | ..... | 0.30 sellers |
| Raub Aust. Gold Ming. Co., Ld. *Fully paid* | 1892 | £200,000 | 191,250 | 50,000 | 1 | 1 | 4,873 | 1s. paid January, '01 ..... | ..... | ..... | 3.50 nom. |
| " " " " *Contrib.* | | | | 150,000 | 1 | 18/10 | ..... | 1s. " " " ..... | ..... | ..... | 3.25 sales. |
| Redjang Lebong Mining Co. | 1898 | *f.*2,000,000 | 1,800,000 | 20,000 *3* | 100 | 100 | ..... | 22 9-10% for year ending 31-12-04 .. | ..... | ..... | 425.00 sales. |
| Royal Johore Tin Mining Co., Ld. | 1900 | $220,000 | 220,000 | 22,000 | 10 | 10 | ..... | 5 " for year ending 15-2-04... | 3.50 | 3.10 | 3.50 buyers |
| Sipiau Tin Co., Ld. | 1899 | $230,000 | 230,000 | 23,000 | 10 | 10 | ..... | 5 " for ½ year ending 30-6-05 | ..... | ..... | 5.25 buyers |
| The Belat Tin Mining Co., Ld. | 1903 | $300,000 | 300,000 | 30,000 | 10 | 10 | ..... | ..... | 5.00 | 4.50 | 4.50 sellers |
| Tronoh Mines, Ld. | 1902 | £160,000 | 149,185 | 160,000 *4* | 1 | 1 | ..... | 7s. paid during 1905..... | 20.75 | 20.25 | 20.25 sellers |
| Duff Development Co., Ld. | 1903 | £400,000 | 350,000 | 400,000 *5* | 1 | 1 | ..... | ..... | ..... | ..... | 8.00 sellers |
| **Rubber.** | | | | | | | | | | | |
| Batu Unjor Rubber Co , Ltd. | 1905 | £700,000 | 610,000 | 61,000 | 10 | 10 | ..... | ..... | 24.00 | 20.00 | $24.00 sellers |
| Bukit Rajah Rubber Co. | 1903 | $70,000 | 61,000 | 70,000 *6* | 1 | ..... | ..... | ..... | ..... | ..... | £3.17s. 6d. ..... |
| Balgownie Rubber Estate Ld. | 1905 | $200,000 | 100,000 | 20,000 | 10 | 6 | ..... | ..... | ..... | ..... | ..... ..... |
| Cicely Rubber Estates Co | 1904 | £12,000 | 10,500 | 6,000 | 1 | ..... | ..... | ..... | ..... | ..... | £2 5s. od. |
| " " " 5% Pref. | | | | 6,000 *7* | 1 | ..... | ..... | ..... | ..... | ..... | £2 5s. od. ..... |
| Pataling Rubber Estate Syndicate | 1903 | £30,000 | 17,500 | 30,000 *8* | 1 | 1 | ..... | ..... | ..... | ..... | £5 5s. od. ..... |
| Ribu Planting Co. Ld. | 1904 | $200,000 | 135,000 | 2,000 *9* | 100 | 100 | ..... | ..... | ..... | ..... | $270.00 ..... |
| Sandycroft Rubber Co. | 1904 | $100,000 | 85,000 | 1,000 *10* | 100 | 100 | ..... | ..... | ..... | ..... | $188.00 buyers. |
| Selangor Rubber Co. Ld. | 1898 | £30,000 | 26,000 | 30,000 *11* | 1 | 1 | ..... | ..... | ..... | ..... | £7 17s. 6d. ..... |
| Sione Rubber Company, Ld. | 1904 | $100,000 | 88,000 | 1,000 *12* | 10 | 10 | ..... | ..... | ..... | ..... | $15.00 ..... |
| Singapore & Johore Rubber Co. Ld. | 1903 | $100,000 | 78,750 | 150 | 100 | 100 | ..... | ..... | ..... | ..... | $150.00 sellers |
| " " " " " " *Contrib* | | | | 850 | 100 | 75 | ..... | ..... | ..... | ..... | 100.00 buyers. |
| Sungei Way Rubber Co. *Fully paid* | 1904 | £50,000 | 13,920 | 6,920 | 1 | 1 | ..... | ..... | ..... | ..... | £2 3s. od. ..... |
| " " " " *Contrib.* | | | | 43,080 *13* | 1 | 5/- | ..... | ..... | ..... | ..... | £1 9s. od. ..... |
| Vallambrosa Rubber Co. | 1904 | £60,000 | 50,000 | 60,000 *14* | 1 | ..... | ..... | ..... | ..... | ..... | £4 17s. 6d. ..... |
| **General.** | | | | | | | | | | | |
| Fraser & Neave, Ld. | 1898 | $225,200 | 225,000 | 4,500 | 50 | 50 | 112,500 | 10 p. ct. and 2½ per cent bonus for '04 | ..... | ..... .. | 105.00 sellers. |
| Hogan & Co., Ld. | 1904 | $480,200 | 334,800 | 3,348 | 100 | 100 | 5,000 | 7 per cent for 1904..... | ..... | ..... | 40.00 sellers |
| H'kong and Shanghai Banking Corporation | 1865 | $10,000,000 | 10,000,000 | 80,000 | 125 | 125 | 10,000,000 *18*<br>8,500,000<br>250,000 *19* | 35s. for ½ year ending 30-6-05..... | ..... | ..... | 850.00 ..... |
| Howarth Erskine, Ld. | 1901 | $1,200,000 | 1,200,000 | 12,000 | 100 | 100 | 275,000 | 10% and 5% bon. for yr. end. 30-6-05 | 275.00 | 270.00 | 275.00 sales |
| Maynard & Co., Ld. | 1901 | $34,000 | 34,000 | 3,400 | 10 | 10 | ..... | 15 per cent for year ending 31-10-05.. | ..... | ..... | 23.00 sellers |
| Riley, Hargreaves & Co., Ld. | 1899 | $875,000 | 875,000 | 6,000 | 100 | 100 | 150,000 | 10 p. ct. and 2½ p. ct. bon. for year '04 | ..... | ..... | 200.00 sellers |
| " " " " 7% Pref. .. | | | | 2,750 | 100 | 100 | ..... | 7 p. ct. for year 1904..... | ..... | ..... | 115.00 buyers |
| Singapore Cold Storage Co., Ld. | 1903 | $600,000 | 240,000 | 24,000 *15* | 10 | 10 | ..... | ..... | ..... | ..... | 10.00 sales |
| Singapore Dispensary Ld. | 1891 | $30,000 | 30,000 | 600 | 50 | 50 | 19,000 | 12½ per cent for year ending 31-7-04 | ..... | ..... | 72.50 sellers |
| Straits Ice Co., Ld. | 1884 | $200,000 | 200,000 | 2,000 | 100 | 100 | 22,000 | 5 " interim for 1905..... | ..... | ..... | 150.00 buyers |
| Straits Steam Ship Co., Ld. | 1890 | $500,000 | 421,500 | 5,000 *16* | 100 | 100 | 400,000<br>169,228 *20* | 5 p. ct. interim for 1905..... | ..... | ..... | 150.00 sellers |
| Straits Trading Co., Ld. | 1887 | $3,000,000 | 2,500,000 | 300,000 *17* | 10 | 10 | 700,000<br>1,021,395 *21* | 10 p.ct. & 5 p.ct. bon. ½ yr. end. 30-9-05 | 42.25 | 42.00 | 42.25 sellers |
| Tanjong Pagar Dock Co., Ld. | 1864 | $3,700,000 | 3,700,000 | 37,000 | 100 | 100 | 1,950,000 | $20 for half year ending 31-12-04..... | ..... | 460.00 | 475.00 sales |
| **Debentures.** $ | | | | | | | | | | | |
| Howarth Erskine Ld. 7 per cent ... 250,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3 per cent prem. |
| Singapore Municipal 6 " ... 400,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3 " nominal. |
| " " 5 " ...1,878,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... .. | 3 " prem buyers. |
| " " 4 " ... 602,300 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 2 " dis. nominal- |
| Riley, Hargreaves & Co., Ld. 6 p. cent 225,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 3 " prem buyers. |
| Tanjong Pagar Dock Co., Ld. 6 " 250,000 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... .... | 2 " prem nom. |
| " " " " 5 " 1,365,500 | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | ..... | 1 " prem. |

*1* 3,500 unissued.
*2* 13,300 "
*3* 2,000 "
*4* 10,815 "
*5* 50,000 unissued.
*6* 9,000 "
*7* 1,500 "
*8* 12,500 " Mort. £5,000
*9* 650 unissued
*10* 150 "
*11* 4,000 "
*12* 1,200 "
*13* 8,080 unissued.
*14* 10,000 "
*15* 36,000 "
*16* 785 "
*17* 50,000 "
*18* Special Gold Reserve Fund.
*19* Insurance Fund.
*20* Sundry Reserves.
*21* Sundry Reserves.
*22* 5,100 unissued.

# YOKOHAMA SHARE QUOTATIONS

COURTESY A. C. HUTTON POTTS, SHARE AND GENERAL BROKER, YOKOHAMA, DECEMBER, 1905.

| STOCKS. | CAPITAL. | NO. OF SHARES. | ISSUE VALUE. | AMOUNT PAID UP. | RESERVE FUND. | AT WORKING ACCOUNT OR CARRIED FORWARD. | DATE. | LAST DIVIDEND. | FOR TERM. | CLOSING QUOTATION. |
|---|---|---|---|---|---|---|---|---|---|---|
| | Y. | | Y. | Y. | | | | | | |
| Brett & Co., Limited | 28,000 | 2800 | 10 | 10 | | | 30/6/03 | 6% | for 1 year | 7 Nominal. |
| Club Hotel, Limited | 185,000 | 1850 | 100 | 100 | | | 31/3/04 | 7% | ,, 1 year | 50 Nominal. |
| Grand Hotel, Limited | 250,000 | 2500 | 100 | 100 | | Y.2,608.34 | 30/6/05 | 6% | ,, ½ year | 225 Nominal. |
| Helm Bros., Limited | 186,000 | 3720 | 50 | 50 | | Y.8,349.06 | 31/12/04 | 17½% | ,, 1 year | 77½ Sales. |
| Langfeldt & Co., Limited | 150,000 | 1500 | 100 | 100 | | Dr.30,174.81 | 30/6/05 | | ,, ½ year | 35 Buyers. |
| C. Nickel & Co., Limited | 125,000 | 5000 | 25 | 25 | | 10,572.91 | 31/10/04 | 16% | ,, 1 year | 32½ Sellers. |
| Japan Brewery Company, Limited | 450,000 | 9000 | 50 | 50 | 170,000 | 4,781.87 | 31/12/04 | | ,, 1 year | 130 Sellers. |
| Yokohama Engine and Iron Works | 130,000 | 2600 | 50 | 50 | 20,000 | Y.5,935.35 | 31/5/05 | 20% | ,, 1 year | 120 Sellers. |
| Hirano Mineral Water Co., Ltd. | 125,000 | 5000 | 25 | 25 | | | | 1st year | | 25 Sellers. |
| Oriental Hotel, Ltd., Old Ordinary | 251,000 | 1490 | 50 | 50 | 60,542.50 | | 31/8/05 | 12% | ,, 1 year | 75 Nominal. |
| ,, ,, New ,, | | 1510 | 50 | 25 | | | | | | |
| ,, ,, Old Preference | | 750 | 50 | 50 | | | | 8% | | 63 Sales. |
| ,, ,, New ,, | | 1250 | 50 | 25 | | | | | | |
| ,, ,, Founders | | 80 | 12½ | 12½ | | | | Y.37 | | 500 Sales. |

| DEBENTURE LOANS. | AMOUNT OF LOAN. | FACE VALUE OF DEBENTURES. | RATE OF INTEREST. | INTEREST PAYABLE. | CLOSING QUOTATION. |
|---|---|---|---|---|---|
| Japan Brewery Company, Limited | 200,000.00 | 100.00 | 7% | 1 April and 1 October. | 108 Sales. |
| Brett and Company, Limited | 11,500.00 | 100.00 | 7% | 1 June and 1 Dec. | 95 Sellers. |
| Yokohama United Club | 250,000.00 | 100.00 | 7% | 30 June and 31 Dec. | 108 Sales. |
| C. Nickel and Company, Limited | 50,000.00 | 100.00 | 8% | 1 May and 1 Nov. | 110 Sellers. |

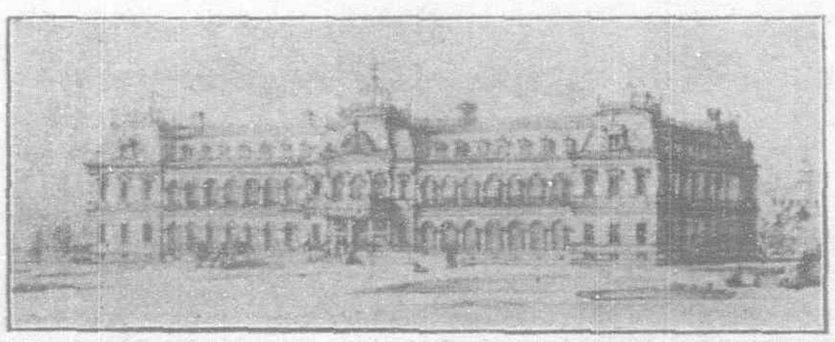
# MANILA SHARE QUOTATIONS

COURTESY MESSRS. W. A. FITTON & CO., MANILA, P. I., JANUARY, 1906.

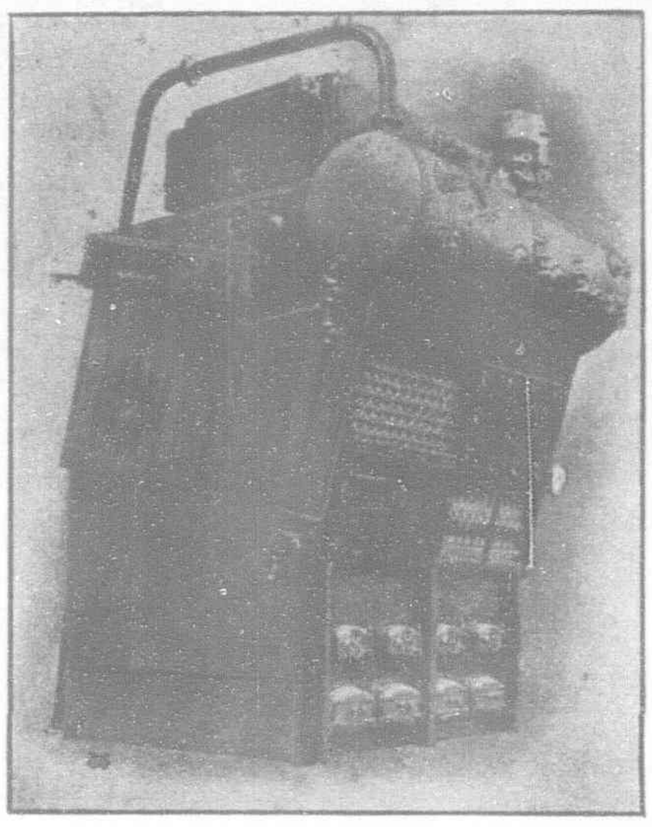
| STOCK. | When Establis'd. | CAPITAL. | NO. OF SHARES. | VALUE. | PAID UP. | RESERVE. | LAST DIVIDEND AND WHEN PAID. | QUOTATION. |
|---|---|---|---|---|---|---|---|---|
| **Banks.** | | | | | | | | |
| Banco Español-Filipino | 1852 | ₱1,500,000 | 7,500 | 200.00 | all | † ₱900,000 | 8 per cent for year ended 31st Decr. 1904 | Sales @ ₱300 |
| Yuen Sheng Exchange & Trading Co. | 1904 | 2,000,000 | 10,000 | 200.00 | 100 | First year | | Buyers @ ₱125 |
| **Cigar Companies** | | | | | | | | |
| Alhambra | 1898 | 60,000 | 300 | 200 00 | all | * None | None since 1898 | Sellers @ ₱165 |
| Dos Hermanas | 1905 | †* 50,000 | 250 | 200.00 | all | First year | First year | Nominal @ ₱200 |
| Germinal | 1899 | 511,817.97 | 720 | 500.00 | all | ₱98,878.27 | 4 per cent year ended 31st Dec. 1904 | Sellers @ ₱600 |
| Maria Cristina | 1901 | 135,000 | 300 | 450.00 | all | None | 5 per cent for 1904; written off ₱35,000 | Sellers @ ₱450 |
| **Dock.** | | | | | | †† | | |
| Varadero (Cañacao) Slip | 1884 | 450,000 | 4,500 | 100.00 | all | ₱271,745.03 | 2½ per cent for ½ year ended Sept. 30/05 | Nominal @ ₱100 |
| **Shipping.** | | | | | | | | |
| Compañía Marítima | 1897 | ** 1,200,000 | 6,000 | 200.00 | all | ** None | None. Insurance Reserve Fund of ₱46,573.89 | Sellers @ ₱150 |
| **Gold Mining & Dredging.** | | | | | | | | |
| Eastern Mining Co | 1904 | *⁂ $3,000,000 | 3,000,000 | $1 | "A" | None | None | Nominal |
| Oriental Mining Co | do | *⁂ $1,500,000 | 1,500,000 | $1 | "B" | do | do | do |
| Philippine Mining Co | do | *⁂ $3,000,000 | 3,000,000 | $1 | "C" | do | do | Sellers @ 20 cents. |
| Philippines Mining, Power & Development Co | do | *⁂ $1,500,000 | 1,500,000 | $1 | "D" | do | do | Nominal. |
| **Insurance.** | | | | | | | | |
| Yektongling Fire & Marine | 1903 | $2,000,000 | 10,000 | 200.00 | 100 | ₱30,000 | 10 % for year ended 31-12-04 | Buyers @ ₱120 |
| **Sundry.** | | | | | | | | |
| Batan Coal Mining Co | 1902 | 1,000,000 | 5,000 | 200 00 | all | None | None | Nominal @ ₱200 |
| "La Concha" Button Factory | 1905 | 75,000 | 750 | 100.00 | all | None | First year | Sellers @ ₱100 |
| Fábrica de Hielo (Ice Co.) | 1886 | 350,000 | 7,000 | 50.00 | all | ₱59,224.08 | Interim dividend of 8 % on 6 mos. working ended June 30 05 | Sellers @ ₱85 |
| Iron Works (San Nicolás) | 1900 | 300,000 | 600 | 500.00 | all | None | Dividend for 1903, but unpaid, ₱94,520.57 at credit of P. & L. Dec. 31 04 | Sellers @ ₱200; |
| Montserrat Bakery Co | 1905 | 20,000 | 40 | 500.00 | all | First year | First year | Sellers @ ₱525 |
| Philippines Co | 1904 | ⁂ 675,000 | 67,500 | 10.00 | all | None | None | Buyers @ ₱3 00 |

† { Reserve Fund..... ₱225,000. { do voluntary ₱675,000.
* ₱20,226 96 carried to debit of P. & L. a/c June 30/05.
⁂ Hongkong Currency.
** Reduced 1905 from ₱3,000,000 to ₱1,200,000.
*⁂ Gold Currency.
"A" 2,115,000 shares issued.
"B" 1,200,000 ,, ,,
"C" 2,500,000 shares issued.
"D" 1,000,000 ,, ,,
†† { Reserve Fund..... ₱106,077.17 { do. voluntary ₱165,667.86
⁂⁂ ₱14,083.03 carried to debit of new account on 2 years' working.
†* Authorized to issue ₱50,000 Preference Shares @ 8%





**N. B.—During the absence of Mr. David W. Bell in England, the representation of Messrs. BABCOCK & WILCOX will be carried on by POOLE, LAUDER & CO., No. 2 Yang-King-Pang, Shanghai; also at Tientsin and Hankow.**



MARINE TYPE FOR LAND PLANTS

Superheaters.
Feed-Water Heaters.
Economisers.
Steam Piping.
Steel Chimneys.
Water Purifiers and Softeners.
Coal-Conveying Machinery.
General Boiler-House Accessories.

*Patent Chain Grate Mechanical Stokers*

**SMOKELESS COMBUSTION** and **HIGH EFFICIENCY** with Bituminous Coal. Continuous Working, Low Cost of Upkeep, Self-Clinkering and Easy Manipulation.

Extract from 1904 Report of F. H. W. Aldridge, Municipal Electrical Engineer of Shanghai:

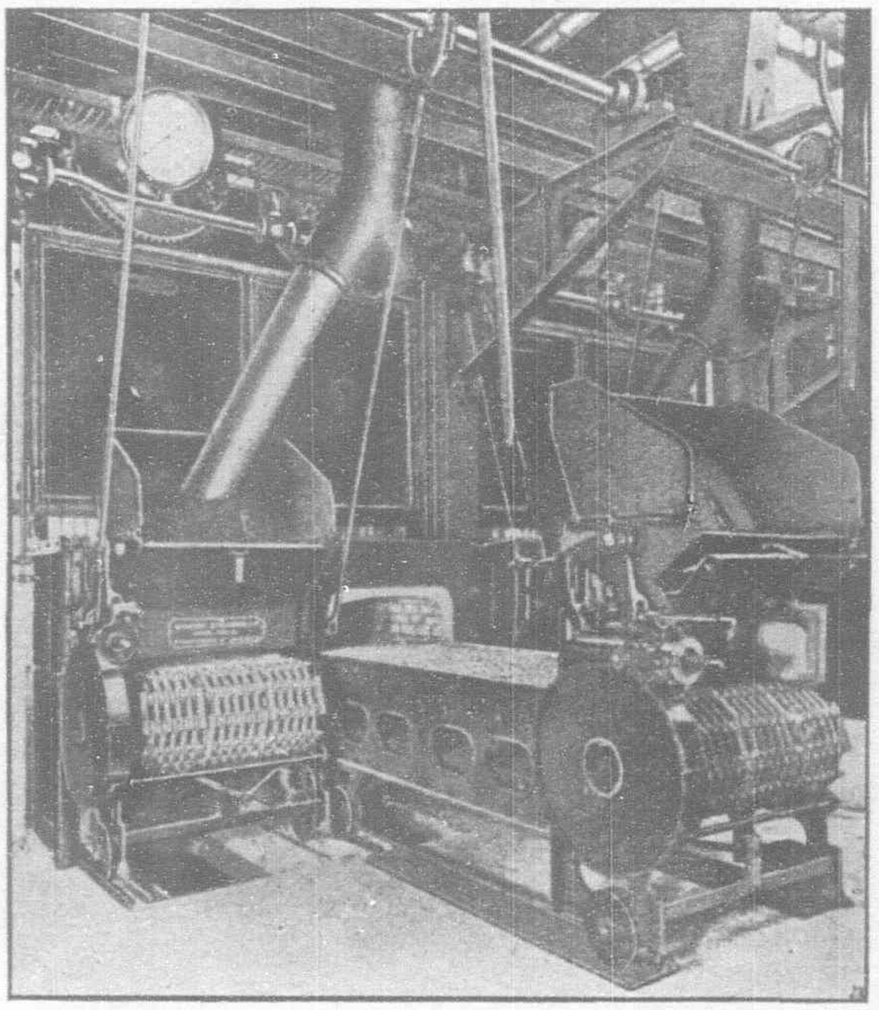
"It will be learnt with pleasure that the operation of the **MECHANICAL STOKERS** in the new Boiler (B. & W.) has so far successfully overcome the smoke nuisance. With this boiler working the emission of black smoke from the chimney shaft is entirely absent, only a thin white vapour at times being visible."

**4,500,000 HP. IN USE**

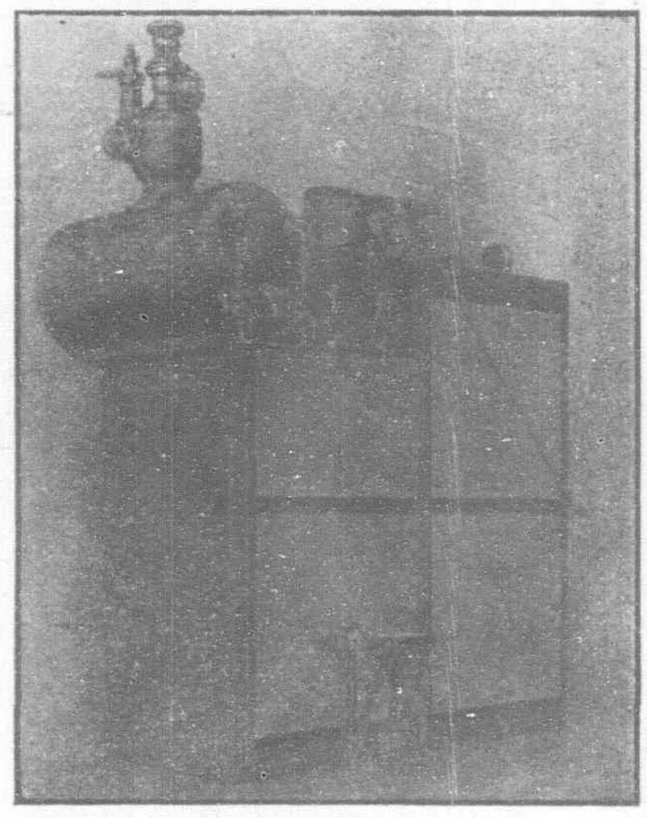
# BABCOCK & WILCOX LIMITED

Head Offices: ORIEL HOUSE, FARRINGDON STREET, LONDON, ETC.
Works: RENFREW, SCOTLAND.

*Patent Water-Tube Boilers*



MANCHESTER CORPORATION ELECTRICITY WORKS, STUART STREET



PORTABLE TYPE, REAR VIEW

*Patent Portable Boiler*

Specially constructed for use in mountainous districts, and shipped in small packages of light weight, for easy transport by Cart, Coolies or Mule-back.

*Marine Boilers*

Specially suitable for light draught and river steamers, where economy in weight and space is of importance.

*Marine Type For Land Purposes*

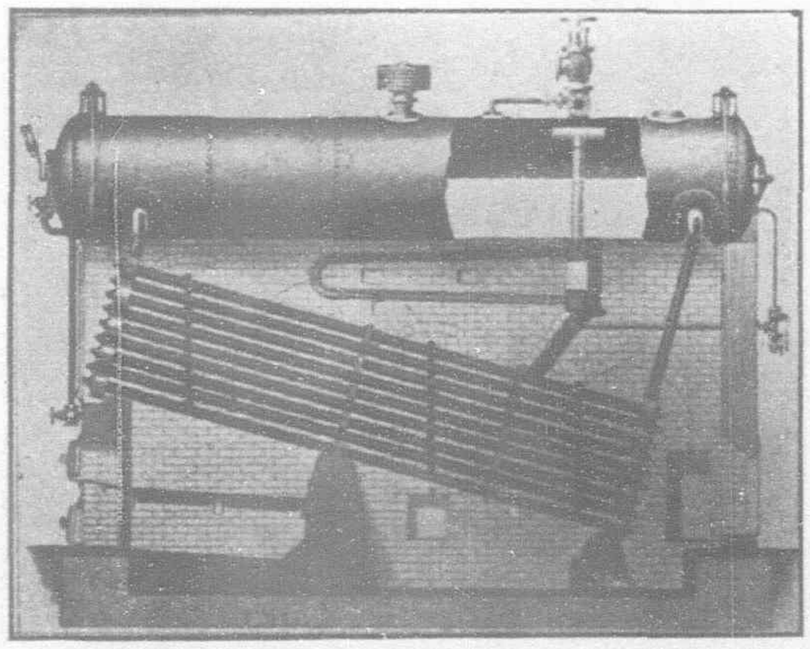
Is frequently used in Electricity Works, and occupies less space for the horse power generated than their Standard Land Type Boiler.

## DAVID W. BELL
REPRESENTATIVE
2 Yang-King-Pang
SHANGHAI

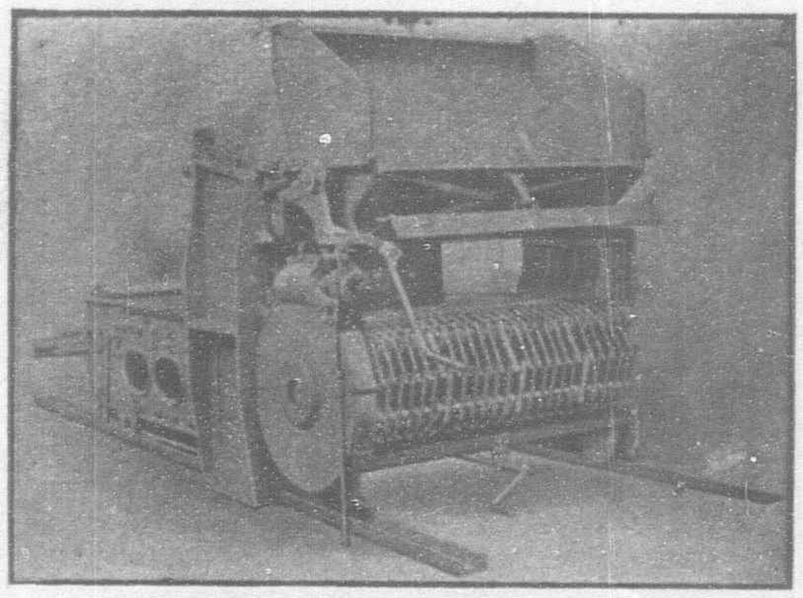
Telegraphic Address:
"GOLDFLOWER"
SHANGHAI
Lieber's Code

AGENTS:

SINGAPORE
Howarth Erskine & Co., Ltd.
RANGOON
Irrawaddy Flotilla Co.
CALCUTTA
Davidson & Co.
YOKOHAMA
B. A. Munster
SOURABAYA
J. R. F. Hellendoorn
COLOMBO
Walker Sons & Co., Ltd.
BANGKOK
MacKay & MacArthur



STANDARD LAND TYPE BOILER OF WHICH SOME 35,000 HAVE BEEN MADE



BABCOCK & WILCOX PATENT MECHANICAL CHAIN GRATE STOKER (WITH FIRE-DOOR OPEN)

KOBE
CANTON
SHANGHAI

# SHEWAN, TOMES & Co.

MAIN OFFICE
HONGKONG
No. 16
BEAVER ST.,
NEW YORK

IMPORT AND EXPORT MERCHANDISE, COMMISSION AND SHIPPING AGENTS

Telegraphic Address:
"KEECHONG," Hongkong.

Postoffice Box:
No. 131B.

GENERAL MANAGERS OF

The China Light & Power Co., Ltd., Hongkong
The Green Island Cement Co., Ltd., "
The Hongkong Rope Mfg. Co., Ltd., Hongkong
The China Provident Loan & Mortgage Co., Ltd., Hongkong
The China & Manila Steamship Co., Ltd., Hongkong
The Canton Land Co., Ltd.

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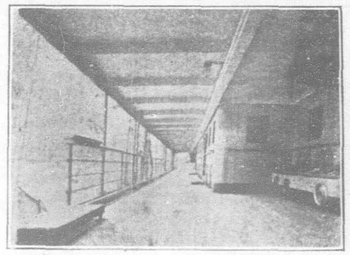

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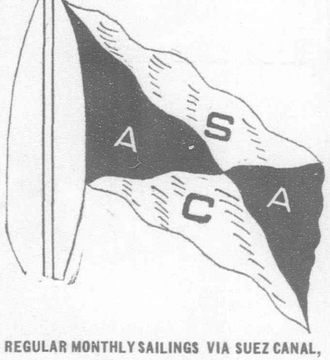


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# THE PHILIPPINE JOURNAL OF SCIENCE

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## CONTENTS



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# DEPARTMENT OF COMMERCE AND POLICE.

## BUREAU OF PORT WORKS.

# MANILA STEEL WHARVES.

## ADVERTISEMENT.

BUREAU OF PORT WORKS,
*Manila, P. I. December 20, 1905.*

Sealed proposals for the construction of TWO STEEL WHARVES in Manila Harbor will be received until 11 o'clock a. m., April 5, 1906, and then publicly opened.

Information furnished on application to this office or to the Bureau of Insular Affairs, Washington, D. C.

Plans may be seen at the above offices and also at the United States Engineer offices at Chicago, Ill., and San Francisco, Cal., and at the offices of "The Engineering News" and "The Engineering Record" at New York.

W. L. FISK,
*Lieut. Col., Corps of Engineers, U. S. A.,*
*Director of Port Works, Philippine Islands.*

## INSTRUCTIONS TO BIDDERS.

1. The contract, together with the plans and specifications, which form a part of it, which the bidder and the guarantors promise to enter into, may be obtained at this office or at the office of the Bureau of Insular Affairs, Washington, D. C.

Parties making bids are understood as accepting the terms and conditions contained in the contract.

2. The quantities stated herein, although estimated with as much accuracy as is possible, are only approximate, and the bidders, or their authorized agents, are expected to satisfy themselves by personal examination of the location of the proposed work, and by such other means as they may prefer, as to the accuracy of the estimated quantities and the difficulties attending the execution of the work, including the uncertainty of the weather and all other contingencies. They shall not at any time after the submission of a proposal lay claim against the Government of the Philippine Islands on account of any excess or deficiency, absolute or relative, in the estimate.

3. All proposals and guaranties must be made in triplicate upon the printed forms and the guaranty attached to each copy of the proposal. One copy each of the advertisement, instructions for bidders, and specifications must be securely attached to each copy of the proposal and be considered as comprising a part of it.

Copies of the necessary forms may be had upon application in person or by mail to this office or to the Bureau of Insular Affairs, Washington, D. C.

4. Proposals and accompanying documents shall be securely sealed in an envelope plainly marked "Proposal for the construction of two steel wharves at Manila, P. I.," then placed in an outer envelope and addressed to "The Director of Port Works, Manila, P. I."

Proposals must be in the possession of the Director of Port Works before the hour appointed for opening the bids.

5. The guaranty accompanying each proposal must be signed by a surety company authorized by the Philippine Commission, or by two responsible guarantors to be certified as good and sufficient guarantors by a judge or clerk of a United States court, United States commissioner, or judge or clerk of any court of record in the Philippine Islands, with seal of said court attached.

6. A firm, as such, will not be accepted as surety, nor a partner for a copartner or firm of which he is a member.

Stockholders who are not officers of a corporation may be accepted as sureties for such corporations. Sureties, if individuals, must be citizens of the United States or residents of the Philippine Islands owing allegiance to the United States, or subjects or citizens of other Governments residing in the Philippine Islands, having sufficient property therein subject to execution to meet the obligation of the bond.

Any corporation incorporated under the laws of the United States or any State thereof authorized to become surety upon official bonds under the Acts of the Philippine Commission may be accepted as surety.

7. When the principal, a guarantor, or a surety is an individual, his signature to a guaranty or bond shall have affixed to it an adhesive seal. Corporate seals will be affixed by corporations, whether principals or sureties.

All signatures to proposals, guaranties, contracts, and bonds should be written out in full, and each signature to guaranties, contracts, and bonds should be attested by at least one witness, and, when practicable, by a separate witness to each signature.

8. Each guarantor will justify in the sum of forty thousand pesos, Philippine currency.

9. A proposal by a person who affixes to his signature the word "president," "secretary," "agent," or other designation, without disclosing his principal, is the proposal of the individual. That by a corporation should be signed with the name of the corporation, followed by the signature of the president, secretary, or other person authorized to bind it in the matter, who must file evidence of his authority to do so. That by a firm should be signed with the firm name, either by a member thereof or by its agent, giving names of all members of the firm.

Anyone signing the proposal as agent of another or others must file with it legal evidence of his authority to bind the firm.

10. The place of residence of every bidder and post-office address, with county and State or town and province, must be given after his signature.

11. All prices must be written as well as expressed in figures, and will be expressed in Philippine currency.

12. Proposals must be prepared without assistance from any person employed in or belonging to the military service of the United States or employed by the Bureau of Port Works, Manila, P. I.

13. All blank spaces in the proposal and bond must be filled in, and no changes shall be made in the phraseology of the proposal or addition to the items mentioned herein. Nor shall any conditions, limitations or provisions be added thereto.

14. Alterations, by erasure or by interlineation, in filling in the proposal must be explained or noted over the signature of the bidder.

15. No bidder will be informed, directly or indirectly, of the name of any person intending to bid or not to bid, or to whom information in respect to proposals may have been given.

16. If a bidder wishes to withdraw his proposal, he may do so before the time fixed for the opening without prejudice to himself, by communicating his purpose in writing to the officer who holds it, and, when reached, it will be handed to him or his authorized agent unread.

17. Reasonable grounds for supposing that any bidder is interested in more than one bid for the same item will cause the rejection of all bids in which he is interested.

18. No proposals received after the time set for opening of proposals will be considered.

19. Failure to comply with any of the conditions named herein will be sufficient ground for the rejection of the proposal.

20. The Government of the Philippine Islands reserves the right to reject any or all proposals and to waive any informality in the proposals received; also to disregard the proposal of any failing bidder or contractor known as such to the Director of Port Works.

21. The bidder to whom award is made will be required to enter into written contract with the Government of the Philippine Islands, with good and approved security in an amount of ten per centum of the amount of his bid, within twenty days after receiving notification of the acceptance of his proposal.

Blank forms of the contract may be seen at this office.

22. The sureties, if individuals, are to make and subscribe affidavits of justification on the back of the bond to the contract, and they must justify in an amount which shall aggregate double the amount of the penal sum named on the bond.

23. Bidders are invited to be present at the opening of the bids.